THE IRON TRADE REVIEW

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Price Advances on Various Finished Products

While the Upward Tendency on Pig Iron Still Prevails—Mills Opposed to Contracting for Next Year

Price advances have been a prominent factor during the past few days. The upward tendency continues on pig iron quotations. Crude steel is extremely strong and a number of finished products, including light rails, sheets, steel pipe and boiler tubes, have been advanced. Most of the higher quotations are on products on which quotations have not moved upward as fast as had been expected and they are believed to be fully justified. The resumption of the charging of extras for twisting reinforcing bars is equivalent to an advance on that product.

The statement of the United States Steel Corporation, showing an increase in bookings during August of 206,296 tons in excess of shipments is indeed remarkable in view of the extremely conservative policy which the Steel Corporation is following in discouraging anything like speculative buying. To a greater extent than ever before during a period of prosperity, the Corporation bookings represent actual business and imperative demand. The Steel Corporation continues to discourage buying for delivery after the first of the new year and independents for the most part are following a similar policy. Many mills, particularly those in the Chicago and Buffalo districts, are so swamped with specifications that large tonnages taken for this year's delivery cannot be rolled until next year. A Buffalo mill is now scheduling structural material for rolling in February.

Pig Iron

After the extremely heavy buying of pig iron during the past few weeks, there has come a natural decrease in activity, but this is not a sign of weakness. On the contrary, prices are firm and many makers are getting more for their iron than they did a week ago. Uncertainties as to costs have caused some hesitation in closing transactions for next year's delivery. In eastern territory, there is a feeling that a shortage of iron may develop before the close of the year, and it would not be surprising to see a similar condition in the central west. Among furnaces on the lakes, the market is very strong and there seems to be little probability that the output of furnaces will increase. Some furnaces which would like to blow in have not been able to contract for iron ore and are not satisfied that iron making would be profitable at the prices which they would be compelled to pay for coke. Eastern Pennsylvania cast iron pipe makers are still buying. One took 2,500 tons of forge for this year at $15.00 at the furnaces and another 3,000 tons of No. 3 and forge. The southern Ohio situation shows increased firmness in prices. Buying by pump, radiator and other companies continues in the east at a somewhat decreased rate. Owing to the prosperous conditions abroad, the demand for American pig iron is becoming an increasingly important factor. Recent sales for export to Genoa, Italy, by the Tennessee Coal, Iron & Railroad Co. amounted to from 5,000 to 6,000 tons. Practically full furnace prices have been obtained. The sales were made at about $16.50, Genoa, on No. 3, and another lot of 3,000 tons is about to be closed. Leading makers predict the southern pig iron market will advance to $14.00 or even $15.00 at an early date. Some sales have been made for delivery on the basis of $13.50, Birmingham. A leading maker is withdrawing this quotation and is about to quote $14.00 for first quarter. An advance of $3.00 per ton has been made on ferro-manganese for delivery after Jan. 1. The new price, $56.50, is the highest since September, 1907.

Railroad Buying

Western railroads continue to inquire for rails for next year's delivery. The St. Paul has placed an order for 10,000 tons additional with the Illinois Steel Co. The Lorain Steel Co. has taken an order for a moderate supply of special track material for Manchester, England. The B. & O. Railroad has ordered 2,000 gondola cars from the Cambria Steel Co. The Pennsylvania Steel Co. has taken 6,000 tons of rails for an eastern road.

Crude Steel

Open-hearth steel consumers during the past few days have found it impossible to obtain billets at less than $25.00, Pittsburgh. Recent sales of crude steel to one large steel maker have aggregated about 40,000 tons, including 6,000 tons from Cleveland. Nearly all makers of semi-finished products in the Pittsburgh district have withdrawn from the market.

PITTSBURGH

Numerous Price Advances Announced

Office of THE IRON TRADE REVIEW, 2148-49 Oliver Bldg., Sept. 10.

The most noticeable feature of the market in this district the past week has been the numerous advances in price values, affecting pig iron, semi-finished and finished steel products. All grades of pig iron have shown strength, rather sharp advances have been experienced in foundry iron, and sales of Bessemer this week indicate that the minimum quotation will soon appear. Semi-finished steel is scarce, and consumers have been forced to meet almost any price that producers have cared to offer. Makers of light steel rails have advanced prices 6 cents per 100 pounds on 25 to 45-pound sections, which places light rails on the same basis as standard sections. Sheet makers have quietly advanced quotations, and most of the leading manufacturers of black and galvanized products are now quoting the former at $2.15 and the latter at $3.30, for No. 28 gage, representing advances of $2 and $3 a ton respectively. Iron bars are now quoted at 1.50c and 1.55c by the leading makers. On Tuesday the leading interest announced a revised classification of steel pipe, and the new list shows advances from $2 to $4 a ton on certain sizes. Manufacturers of steel boiler tubes issued new lists early this week, providing an advance of $2 a ton on all sizes. Coke has been stiffening during the week, and there has been some scarcity, due to floods in the regions and the holiday. Ferro-manganese is scarce, and sellers are quoting $56.50, seaboard, for forward shipment, which is $3 a ton above the quotation of a week ago.

Pig Iron.—The market continues active, and there is more demand for iron for shipment over the rest of the year than there was a week ago. More interest in next year's iron is being taken, both by producers and consumers and there have been several lots of foundry and malleable sold for 1913 shipment. Although there has been considerable inquiry, very little steel making iron has been sold beyond the end of the year, furnace men believing better prices will prevail. Foundry inquiries for next year aggregate about 30,000 tons. Small tonnages have been sold for $14.50 and $14.75, valley, and one of the makers of foundry is refusing to sell at less than $15, valley, although no sales at this figure have been reported. A consumer closed on Monday for 500 tons of foundry for shipment next year at $14.75 and $15, valley, although the bulk of the tonnage was obtained at the minimum figure. Sellers are asking $14.75 for malleable iron for first quarter delivery, although a fairly heavy tonnage was obtained about a week ago at $14.60, valley furnace. Demand for malleable for first and second quarter shipment is not so heavy as that for foundry. Today one of the leading factors in the Bessemer iron market reported a sale of 100 tons at $15.50, valley, for prompt shipment, and this is the highest figure reported. The seller in this instance was in a position to make unusually prompt shipment. There has been but little demand for basic iron for delivery beyond the end of the year, and few sales for this year's shipment are reported. This grade is firm, however, at $14.25, valley. Although it is believed sales beyond the end of the year have been heavier than reported, this district has not experienced the activity which prevails in adjoining territories, and from reports made today it is certain that very little steel-making iron has been obtained for shipment in 1913.

Quotations for prompt and future shipments are identical, and are as follows:

(Prompt and Fourth Quarter Shipment.)	
Bessemer, valley	$14.75 to 15.00
Bessemer, Pittsburgh	15.65 to 15.90
Basic, valley	14.25
Basic, Pittsburgh	15.15
No. 2 foundry, Pittsburgh	15.40 to 15.65
Gray forge, Pittsburgh	14.50 to 14.60
Malleable, Pittsburgh	15.15 to 15.40

Ferro-Alloys.—Following action taken in the east, sellers of ferro-manganese in this district Monday advanced prices $3 a ton, and are now quoting $56.50, Baltimore, for forward shipment. Small tonnages were sold at the end of last week at $53.50, Baltimore, and the sale of a car load was reported just before the last advance at $58, Baltimore, for prompt shipment. Ferro-manganese is scarce, and it is doubted whether any tonnage could be obtained at less than $60, for prompt delivery. There has been no change in the price value of 50 per cent ferro-silicon, which is quoted at $72.50, Pittsburgh, for both prompt and forward shipment.

We quote 80 per cent ferro-manganese at $58, Baltimore, for prompt delivery and $56.50 for forward shipment. The freight rate from Baltimore to Pittsburgh is $1.95 per ton.

Fifty per cent ferro-silicon is quoted nominally at $72.50, Pittsburgh, for prompt and forward delivery; 12 per cent, $22; 11 per cent, $21; 10 per cent, $20, f. o. b. Globe, Jisco and Ashland furnaces. The freight rate to Pittsburgh is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

On ferro-titanium we quote 8 cents per pound for carload lots; 10 cents per pound for 2,000 pound lots and over, and 12½ cents per pound in lots up to 2,000 pounds.

Plates.—Nearly all the leading makers of plates in this district have enough tonnage on their books to keep their mills busy until the end of the year, and little or no new business is being solicited. Consumers who have needed material for immediate use have been paying premiums from between $2 and $3 a ton. Since the last report, the Cambria Steel Co. has received an order from the Baltimore & Ohio railway for 2,000 steel gondola cars and an order from the Cambria & Indiana railway for 400 steel hopper cars. It is reported the American Car & Foundry Co. has taken an order for 250 hoppers from the Pittsburgh, Shawmut & Northern and the Burlington interests have placed orders for 1,000 gondolas, although nothing definite regarding this transaction is announced. Inquiries are somewhat better than a week ago.

Plates are quoted as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.35c to 1.40c; Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end being not less than 30 inches 0.10c; circles, 0.20c. Plates in widths over, 100 inches up to 110 inches 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ¼ inch to and including 3-16-inch plate on thin edge, 0.10c; under 3-16 and including No. 9,

0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—Nearly all makers of black and galvanized sheets have advanced prices this week. Those who continue to quote former prices are practically out of the market because of deferred shipments. It was learned today that several mills have been quoting $2 and $3 a ton above the prevailing figures for more than a week. Black sheets have been advanced $2 a ton, and nearly all makers are asking $2.15 for No. 28 gage. Blue annealed sheets, which were advanced several weeks ago, have not been changed, and No. 10 gage is quoted at $1.50. An advance of $3 a ton is announced for galvanized products, and $3.30 is being quoted on No. 28 gage. Several makers have not withdrawn former quotations, although it is believed impossible to obtain material below the maximum quotations. Shipments are more deferred than a week ago, and it is impossible to get galvanized products in less than three months. Minimum quotations will be withdrawn before the end of the week.

Revised quotations are as follows:

Flat Sheets.

Black Sheets.—Nos. 10-12 gage, $1.70 to $1.80 per 100 pounds; Nos. 13-14 gage, $1.75 to $1.85; Nos. 15-16 gage, $1.80 to $1.90; Nos. 17-21 gage, $1.85 to $1.95; Nos. 22-24 gage, $1.90 to $2.00; Nos. 25-26 gage, $1.95 to $2.05; No. 27 gage, $2.00 to $2.10; No. 28 gage, $2.05 to $2.15; No. 29 gage, $2.10; No. 30 gage, $2.20 to $2.30.

Tin mill sizes, Nos. 15-16 gage, $1.80 to $1.90 per 100 pounds; Nos. 17-21, gage, $1.85 to $1.95; Nos. 22-24 gage, $1.90 to $2.00; Nos. 25-27 gage, $1.95 to $2.05; No. 28 gage, $2.00 to $2.10; Nos. 29-30 gage, $2.05 to $2.15; Nos. 30½-31 gage, $2.10 to $2.20; No. 32 gage, $2.15 to $2.25.

Blue Annealed.—Nos. 3-8, $1.45 per 100 pounds; Nos. 9-10, $1.50; Nos. 11-12, $1.55; Nos. 13-14, $1.60; Nos. 15-16, $1.70.

Galvanized.

Nos. 10-11 gage, $2.15 to $2.30 per 100 pounds; Nos. 12-14 gage, $2.25 to $2.40; Nos. 15-16 gage, $2.40 to $2.55; Nos. 17-21 gage, $2.55 to $2.70; Nos. 22-24 gage, $2.65 to $2.80; Nos. 25-26 gage, $2.85 to $3.00; No. 27 gage, $3.00 to $3.15; No. 28 gage, $2.85 to $3.00; No. 29 gage, $3.25 to $3.40; No. 30 gage, $3.45 to $3.60.

Roofing Sheets.

Net extras on all gages per 100 pounds. Corrugated 2-inch, 2½-inch, 3-inch and 5-inch corrugation, 5c; 2 V crimped without sticks, 5c; corrugated 1¼-inch corrugation, 10c; 3 V crimped without sticks, 10c; pressed standing seam with cleats, 15c; plain roll roofing with or without cleats, 15c.

Painted Roofing.

12 to 18 gage, inc., 5c; 19 to 24 gage, inc., 10c; 25 to 28 gage inc., 15c.

Tin Plate.—All of the makers of tin plate are now asking $3.60 per 100 pounds, the leading interest having announced the adoption of this quotation on Tuesday of this week. Some tonnage has been obtained at this figure for next year's delivery, although some of the most prominent makers continue to refuse to contract beyond the end of the present year. Nearly all of the consumers, the heaviest ones at least, have covered requirements for this year, and few new orders have been placed within the past week. Some of the can factories are asking additional tonnages, where requirements were underestimated. Shipments have been unusually heavy, and difficulty has been experienced in accumulating mill stocks. Following are the revised quotations:

Coke tin plate, 100-pound basis, 14 x 20, $3.60, f. o. b. mill, Pittsburgh district.

Rails and Track Material. — On Thursday of last week, the Carnegie Steel Co., and other makers of light rails, announced an advance in quotations, which changes the price of 25 to 45-pound sections to 1.25c, equivalent to an advance of 6 cents per 100 pounds. The same advance holds on lighter rail, 16 to 20-pound sections being quoted at 1.30c per pound; 12 and 14-pound sections, 1.35c and 8 to 10-pound sections 1.40c per pound in carload lots. Light rails are now on the same basis as standard sections, but have not yet reached their normal quotation. No change in standard sections has been announced. Demand continues heavy, and small tonnages are being sold for next year's shipments. Active buying for next year's requirements is not expected to begin for several weeks. Spikes are firm on the base of $1.75 for standard sizes, and it is impossible to shade this figure. Rails are quoted as follows, with the base price on open-hearth sections 1.34c per pound at the mill:

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.25c, the schedule on the other weights being irregular and subject to negotiations; angle bars for standard sections, 1.50c, Pittsburgh; track bolts, 2.00c to 2.10c, Pittsburgh.

Railroad Spikes.

4½, 5 and 5½ and 9-16	$1.75
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x 7-16	.20
3, 3½, 4 and 4½ x ⅜	.30
2½ x ⅜	.40
2½, 3 and 3½ x 5-16	.60
2 x 5-16	.80

Billets.—The strength of the semi-finished steel market has been clearly indicated in developments the past week. Open-hearth steel consumers, who have entered the market the past three or four days, report that it is impossible to obtain material at less than $25, Pittsburgh, and it is doubted whether this quotation can be shaded. Several days ago a sale, involving more than 1,000 tons of small open-hearth billets, was closed at a little above $26.25, Pittsburgh, for prompt delivery. Although this sale does not necessarily establish a market price, it goes to show the willingness on the part of consumers to pay whatever makers care to ask, and it clearly indicates that the semi-finished market is controlled by sellers. It is reported that Bessemer products are almost equally as strong. Bessemer billets are not obtainable at less than $24, and many claim that Bessemer sheet bars cannot be found at this figure. Small tonnages, the past week or 10 days, have been sold at $24. With one or two exceptions, all makers of semi-finished products in this district have withdrawn from the market, being unable to offer further material for fourth quarter delivery. Forging billets cannot be obtained at quotations that have prevailed for some time, and they are nominally quoted at $29.50 and $30, Pittsburgh.

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $23.50 to $24.00, with the usual extra for size and analysis, and open-hearth rolling billets, $24.00 to $25.00. Bessemer sheet and tin bars are quoted at $23.00 to $24.00, and open-hearth sheet bars are quoted $24.00 to $25.00, f. o. b. Pittsburgh and Youngstown for fourth quarter, with full freight to destination added. Forging billets are quoted at $29.50 to $30.00, Pittsburgh.

Hoops and Bands.—One of the leading independent makers of hoops is now asking 1.50c for these products and 1.40c for bands, and has booked tonnages at these figures during the past week with little or no difficulty. The leading interest continues to quote 1.30c and 1.40c for hoops and bands, respectively, although little tonnage is being accepted on account of deferred shipments. Quotations are as follows:

Hoops in carload lots, 1.40c to 1.50c; Pittsburgh; in less than carload lots, 1.45c to 1.55c; bands 1.30c to 1.40c, base, with net extras, as per standard steel.

Merchant Bars.—Makers of iron bars in this district have advanced prices during the past week, and are now asking 1.50c and 1.55c, Pittsburgh, although it is believed it is still possible to obtain tonnage at the former maximum quotation, 1.45c. There has been rather heavy new demand for iron bars, and shipments are deferred a couple of months. The leading interest continues to quote 1.30c on steel bars, although very little new tonnage is being booked because of deferred shipments. Independent steel bar makers are quoting 1.35c, and sales at 1.40c and as high as 1.50c have been reported, premiums being paid for prompt shipments. Inquiry for bars for 1912 shipment is rather active. As announced a week ago, cold-rolled shafting was advanced by some of the mills, and all makers are now asking 62 per cent off for carload lots and 57 per cent off for less than carload lots. It is reported that at least one of the mills has announced that shafting sold for 1913 delivery will be on the basis of 60 per cent off for car

loads and 55 per cent off for less than car loads.

Common iron bars, 1.50c to 1.55c, Pittsburgh; Bessemer and open-hearth steel bars, 1.30c to 1.35c; plow and cultivator, 1.30c to 1.35c, channels, angles, zees, tees, under 3 inch, 1.40c to 1.45c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds and not less than 1,000 pounds of a size, 0.15 advance, less than 1,000 pounds, 0.35. Cold rolled, and ground shafting, 62 per cent off in carloads and 57 per cent in less than carloads, delivered in base territory.

Muck Bar.—Notwithstanding that muck bar consumers covered requirements earlier in the year, there has been some new demand the past week. Most of the muck bar makers are not in a position to produce surplus tonnage, and difficulty has been experienced by consumers in obtaining additional tonnages. Complaint is heard about the difficulty of getting puddlers by the local mills. It is not believed that muck bar can be obtained at less than $30.50, and quotations are nominally given at $30.50 and $31, Pittsburgh.

Bolts, Nuts and Rivets.—Manufacturers are more anxious about deliveries than new business, all the nut, bolt and rivet makers in this district being deferred from 60 to 90 days. New demand has been fairly brisk and specifying continues heavy. We quote:

Rivets

Button head structural rivets, $1.80; cone head boiler rivets, $2.

Bolt and Nut Discounts

Carriage bolts, ⅜ x 6 inches, smaller and shorter, cut threads, 75, 10 and 7½; larger and longer, 70, 10 and 5.

Machine bolts with hot pressed nuts; ⅜ x 4 inches, smaller and shorter, rolled, 75, 10, 10 and 7½; cut, 75, 10, 10 and 2½; larger and longer, 70, 10 and 10.

Gimlet and cone point lag or coach screws, 80 and 12½.

Hot pressed square, blank or tapped nuts, $6 off list; hot pressed hexagon blank or tapped, $6.70 off.

Cold pressed C. & T. square, blank or tapped, $6 off; hexagon, blank or tapped, ⅝-inch and larger, $7 off; smaller than ⅝-inch, $7.60 off.

Structural Shapes.—No orders of any consequence for fabricated material are reported in this district. Most of the mills have enough tonnages on their books to keep them running beyond the end of the year. Inquiry is somewhat better than a week ago, and small orders represent heavy tonnages in the aggregate. The following quotations are firm:

Beams and channels, 15 inches and under, zees, 1.35c to 1.40c; tees, 1.40c to 1.45c; angles, from 3 to 6 inches, 1.35c to 1.40c; over 6 inches, 1.45c to 1.50c; universal and sheared, 1.35c to 1.40c; over 15 inches, 1.40c to 1.45c; plates, 6¼ inches wide and wider, 1.40c to 1.45c.

Merchant Pipe.—The National Tube Co. today announced a revised classification of steel pipe, the first made in several years. Irregular advances, ranging from $2 to $4 a ton, on certain sizes, are noted in the new list. Other steel pipe makers will adopt the new classification, and it is believed iron pipe makers will soon base prices on a similar card. Pipe mills are from 6 to 12 weeks deferred in shipments. The Youngstown Sheet & Tube Co. has taken a contract for six miles of 6 and 8-inch line pipe for western shipment.

Official discounts to jobbers, subject to the usual preferential discount to the large buyer, are as follows:

Iron and Steel Pipe Basing Prices

STEEL.

	Butt. Black.	Butt. Galv.	Lap. Black.	Lap. Galv.
⅛, ¼ and ⅜ inch.	72	52	..	..
½ inch	76	66	..	..
¾ to 3 inch.....	79	71	..	..
2 inch	..	..	76	68
2½ to 6 inch.....	..	..	78	70
7 inch to 12 inch..	..	..	76	66
13 to 15 inch.....	..	..	53	..
Extra Strong, Plain Ends.				
⅛, ¼ and ⅜ inch.	68	58	..	..
½ inch	73	67	..	..
¾ to 1½ inch.....	77	71	..	..
2 to 3 inch.....	78	72	..	..
2 inch	..	..	74	66
2½ to 4 inch.....	..	..	76	68
4½ to 6 inch.....	..	..	75	67
7 to 8 inch.....	..	..	68	58
9 to 12 inch.....	..	..	63	53
Double Extra Strong Plain Ends.				
½ inch	63	57	..	..
¾ to 1½ inch.....	66	60	..	..
2 to 2½ inch.....	68	62	..	..
2 inch	..	..	64	58
2½ to 4 inch.....	..	..	66	60
4½ to 6 inch.....	..	..	65	59
7 to 8 inch.....	..	..	58	48
IRON.				
⅜ inch	67	51	..	..
½ inch	70	57	..	..
¾ to 1½ inch.....	73	62	..	..
2 and 2½ inch.....	74	63	..	..
2 inch	..	..	70	61
2½ to 4 inch.....	..	..	72	64
4½ to 6 inch.....	..	..	71	63
7 to 12 inch.....	..	..	69	56
Extra Strong Plain Ends, Card Weight.				
⅜ inch	64	53	..	..
½ inch	68	61	..	..
¾ to 1½ inch.....	72	63	..	..
2 and 2½ inch.....	73	64	..	..
2 inch	..	..	67	61
2½ to 4 inch.....	..	..	71	64
4½ to 6 inch.....	..	..	70	63
7 to 8 inch.....	..	..	64	54
9 to 12 inch.....	..	..	59	48
Double Extra Strong Plain Ends, Card Weight.				
½ inch	58	50	..	..
¾ to 1½ inch.....	61	53	..	..
2 and 2½ inch.....	63	55	..	..
2 inch	..	..	56	50
2½ to 4 inch.....	..	..	61	55
4½ to 6 inch.....	..	..	60	54
7 and 8 inch.....	..	..	53	43

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

The above discounts are for full weight pipe, subject to a variation of 5 per cent, merchant pipe, when specified, being furnished up to 6 inches at one point higher discount (lower price).

Boiler Tubes.—The leading interest today advanced the price of steel boiler tubes $2 a ton on all sizes, and independent makers have adopted the new quotations. Makers of iron boiler tubes are expected to announce advanced quotations in a few days. Premiums are paid on both iron and steel products where early shipment is assured. The following discounts, which have been revised, prevail:

	Steel	Iron
1½ inch	..	47
1¾ to 2¼ inch.....	62	48
2½ inch	64½	53
2¾ to 3¼ inch.....	69½	55½
3½ to 4½ inch.....	72	58
5 and 6 inch.....	64½	48½
7 to 13 inch.....	62	..

To destination east of Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburgh. Usual extras to jobbers and boiler manufacturers.

Wire.—There has been heavy specifying for wire products and new demand for both wire and wire nails has been rather active. Mills have practically filled all orders placed on the $1.66 base for nails, nearly all the unfilled tonnage being on the $1.65 and $1.70 base. There has been considerable inquiry for material for next year's shipments, and it is reported that one of the leading independent mills has booked a small tonnage of nails at $1 a ton above the present quotation, although this report has not been fully verified. Consumers are specifying to the limit, as contracts and shipments continue unusually heavy. The following quotations are being firmly held:

Wire nails, jobbers' carload lots, $1.70; retailers' carload lots, $1.75; cut nails (western makers), jobbers' lots, $1.65 to $1.70, painted barb wire, jobbers' carload lots, $1.70; retailers' carload lots, $1.75, with 30c for galvanizing; plain wire to jobbers in carloads, $1.50; and to dealers, in carloads, $1.55; polished staples, $1.70; galvanized staples, $2.00.

Wire Rods.—The market for wire rods is quiet, consumers having covered requirements earlier in the year. Although quotations are nominally given at $26 and $27, Pittsburgh, for Bessemer and open-hearth rods, respectively, it is claimed by many that it would be impossible to shade the maximum quotation.

Coke.—Furnace coke has been somewhat stronger the past week, and it has been impossible to obtain fuel for prompt shipment at less than $2.30, ovens. Floods in the coke regions have curtailed production to some extent, and many of the men did not work Labor day. Labor conditions are not so acute as they were several weeks ago, although many of the coke manufacturers continue to advertise for men. Small tonnages of furnace coke have been sold at $2.35 and $2.40, ovens, although it is believed the market is not above $2.30 or $2.35, ovens, for furnace fuel. Foundry coke has been quiet, and nominal quotations continue. According to the Connellsville *Courier*, production made a gain of 2,797 tons for

the week ending Sept. 5, over the week before, the increase being evenly divided. Shipments made a gain of 65 cars. Following are the quotations for this week:

Connellsville	furnace	$2.30 to 2.35
Connellsville	furnace contract	2.30 to 2.35
Connellsville	foundry	2.60 to 2.75
Connellsville	foundry contract	2.60 to 2.75

Old Material.—The market for old material shows indications of strength, although as yet dealers have been unable to obtain above prevailing quotations for stocks. Early this week one of the middlemen reported that heavy melting steel can be sold without difficulty at the maximum quotation, and small tonnages have brought this figure recently. Bundled sheet scrap has been rather active, although the minimum quotation has ruled in all sales during the past week, and it has been impossible to obtain above $9.75 for cast borings. Five hundred tons of No. 1 wrought scrap were sold several days ago at $14.50, the maximum quotation, and stove plate has been showing strength, sales 25 cents above the prevailing maximum quotation being noted.

We quote gross tons, delivered in the Pittsburgh district, including Brackenridge, Steubenville and Follansbee, as follows:

Heavy melting scrap	$13.75 to 14.00
Rerolling rails	14.25 to 14.50
Malleable	12.75 to 13.00
Bundled sheet scrap	12.00 to 12.25
Iron axles	23.00 to 24.00
Old iron rails	15.50 to 16.00
Stove plate	10.25 to 10.75
No. 1 wrought scrap	14.25 to 14.50
Old car wheels	14.00 to 14.50
Low phosphorus	16.25 to 16.50
Machine shop turnings	10.50 to 10.75
Cast borings	9.50 to 9.75
No. 1 cast scrap	13.25 to 13.50

CHICAGO

Increasing Strength of Northern and Southern Pig Iron

Office of THE IRON TRADE REVIEW,
1328 Monadnock Blk., Sept. 10.

The market for finished lines in this territory is unbalanced on account of the absence of quotations from some of the leading producers. In some instances, the mills are six months behind on deliveries and are not in a position to take business earlier than the second quarter. This condition maintains with regard to plates and bars, as well as structural material. Specifications are unabated and it is certain that consumers will take out their entire contract tonnage. With conditions as they are at present, this would indicate that the specifications received throughout the last quarter may in some cases tax the capacity of the mills throughout the first half of the coming year. On this account, it is improbable that any new contracts will be entered into for some months.

Pig Iron.—Both northern and southern iron are giving evidence of increasing strength and strong southern interests are now holding their iron at $13.50, Birmingham, for any delivery. For both the last quarter and the first quarter of 1913, $13, Birmingham, appears to be the minimum. Although some iron is obtainable in this market at $12.50, Birmingham, it is for delivery through September only and the price will not be extended into the last quarter. Inquiry for southern iron is very heavy and increasingly large tonnages are being sought. Sales are reported at current quotations in sufficient numbers to indicate the stability of the market. Northern iron is now firm on a basis of $16, f. o. b. local furnaces, both for the remainder of the year and first quarter and strong local interests are quoting $16.50 at the furnace for second quarter delivery. No second quarter iron will be sold, however, unless accompanied by an order to be delivered during the first quarter. The local furnaces are sold up and continue to dispose of more iron than they can make. Sales of northern iron during the past week have also been very heavy, a considerable number being reported in lots of from 1,500 to 3,500 tons. A prominent manufacturer of gas engines is reported to be in the market for 3,500 tons of No. 2 foundry and inquiries for smaller tonnages are numerous. As certain Chicago interests are reported to be well sold up both for the remainder of the year and for first quarter, this fact coupled with the certainty of a continuance of the present buying movement indicates that further advances in the price of northern iron may be expected in the very near future.

The following prices represent the market for Chicago delivery except northern foundry and malleable Bessemer, which are quoted f. o. b. local furnaces.

	Rest of year.	First quarter.
Lake Superior Charcoal	$16.75	$17.25
Northern foundry No. 2	16.00	16.00
Southern foundry No. 2	17.35	17.35
Southern Silv'res, 5 per cent sil.	17.40	.....
Jackson co. silv'r's 8 per cent.	18.90	.....
Malleable Bessemer	16.00	16.00
Alabama basic	16.35	.....

Billets.—There is continued evidence of congestion in the billet market on account of the increasingly strong position in finished lines. Mills in this territory are still unable to handle any appreciable tonnage and the prices quoted are nominal. We quote, open-hearth forging billets, $30; rerolling billets, $27.

Merchant Bars.—While the first week of the month shows a slight decrease over specifications in some quarters, in general they continue unabated. There is comparatively little iron left in the market at 1.40c, and some independent producers are obtaining 1.50c for the larger part of the business taken. Difficulty in making deliveries is becoming more pronounced and with a continuation of the present demand, this condition will be more troublesome before the first of the year. Steel bars are stronger, with a demand equal to that for iron, in spite of the opposition to higher prices on the part of some western producers. The market for steel bars is stronger and the heavy demand for shafting has culminated in an increase of two points.

We quote, f. o. b. Chicago, as follows:

Bar iron, 1.40c to 1.45c, hard steel bars, rerolled, 1.40c to 1.45c; soft steel bars, bands and small shapes, 1.58c; hoops, 1.58c to 1.63c; smooth finished machinery steel, 1 inch and larger, 1.78c; shafting 62 per cent off list for carload lots, 57 per cent off for less than carloads.

On iron and steel from local stock we quote, as follows:

Bar iron, 1.85c per pound base; soft steel bars, 1.85c per pound base; soft steel hoops, 2.10c, full extras.

Structural Material.—Western mills continue to be swamped with specifications for shapes and as the leading interest is out of the market and the independent western mills are able to take but little tonnage, the repre-

sentatives of eastern mills are obtaining the larger part of the business. The total of the structural contracts for the week is 4,479 tons, of which the leading interest has taken 810 tons from the city of St. Louis for the superstructure for the approach of the bridge over the Mississippi river. The Modern Steel Structural Co. has taken 708 tons from the city of Minneapolis for the Forty-second avenue bridge and 1,560 tons from the same buyer for the bridge at Plymouth avenue. A contract for 298 tons consisting of three structural steel plate girders has been let by the city of Chicago to the Central States Bridge Co., and the Kenwood Bridge Co. has taken 244 tons from the Locomotive Superheater Co. for a shop building at Chicago. Other contracts placed during the week include 631 tons, taken by the Virginia Bridge & Iron Co. from the Southern Traction Co. for a line between Dallas and Waco; 274 tons let by the Northern Pacific Railway Co. for bridges No. 116 and 118, St. Paul division, and 200 tons placed by the Chicago, St. Paul, Minneapolis & Omaha Railway Co. for bridge material.

We quote, mill prices, f. o. b. Chicago, as follows:

Beams and channels, 15 inch and under, 1.58c. For extras, see Pittsburgh report.

Store prices are as follows:

All angles, 3 inches and larger, including 6 inches, $1.95 per 100 pounds; angles over 6 inches, $2.00 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.95 per 100 pounds, base; channels, 3 inches and larger, $1.95 per 100 pounds, base.

Rails and Track Fastenings.—The Burlington, Cedar Rapids & Northern has ordered 5,000 tons of rails from the Illinois Steel Co., and other small tonnages are understood to have been placed during the past week. It is understood that the Chicago & Northwestern is inquiring for 80,000 tons of rails and the Chicago, Milwaukee & St. Paul for 50,000 tons, but nothing definite regarding the placing of this business has been learned. The movement of tonnage in track fastenings is still increasing and the excess tonnage in this material over previous years may be in part attributed to the increasing use of tie plates by western roads, this item having become standard equipment. The quotations on both rails and track fastenings are stronger and, while consumers are insistent in their demands for 1913 requirements, no business for delivery at that time has been placed.

We quote, light rails, f. o. b. Chicago, and track fastenings, f. o. b. Joliet, as follows:

Light rails, carloads, 25 to 45-pound, 1.30c; 16 to 20-pound, 1.35c; 12-pound, 1.40c; 8-pound, 1.50c.

Light section relayers, 45 pounds and under, subject to inspection, $21 to $23; standard section relaying rails, subject to inspection, $22 to $23.

Track fastenings, f. o. b. Joliet, angle bars, 1.50c; railroad spikes, 1.80c to 1.90c; smaller size spikes, 1.70c base; track bolts with square nuts, 2.20c to 2.30c.

Plates.—The situation in the plate market is bare of any interesting developments, western producers continuing full for the rest of the year and practically out of the market. Car builders in the west are all operating at capacity and as the prospects of a car shortage in the near future are very strong, the railroads are still buying liberally. Car makers as well as all other consumers are taking out their entire contract tonnage in specifications, and it is probable that the prevailing conditions in the plate mills during the first quarter will parallel those obtaining in shapes, producers being unable to book new business for delivery during that period. The Atchison, Topeka & Santa Fe is in the market for from 25 to 50 ore cars, and the Missouri & Northern Arkansas is in the market for three steel baggage and mail cars. The Chicago, Burlington & Quincy is reported to have placed an order for 1,000 gondola cars, but this item has not been confirmed.

We quote, f. o. b. Chicago, as follows:

Tank plates, ¼ inch thick, 6⅝ to 100 inches wide, 1.58c. For extras, see Pittsburgh report.

Store prices are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, 1.95c.

Sheets.—The last evidence of weakness has disappeared from the sheet market and prices are being forced upward both on account of the heavy demand and the curtailing of the supply. One of the strongest independent producers in the west has withdrawn all quotations on galvanized sheets, as with the continued high price of spelter it is not thought that their manufacture is profitable at present quotations. The position of the warehouse is even stronger and is impaired only by the possibility of shortages in some sizes. High premiums continue to be offered for early delivery, but the mills are unable to handle such business at any price.

We quote f. o. b. Chicago, as follows:

Blue annealed, No. 10, 2.15c; No. 12, 2.20c. Box annealed, No. 28, 2.70c. Galvanized No. 28, 3.80c.

For mill prices, see Pittsburgh report. Freight to Chicago, 18 cents.

Wire Products.—The leading interest continues to obtain the bulk of the business in this territory at prevailing quotations, and there is no indication of a cessation in demand. Jobbers are showing a disposition to take out their entire contract tonnage in specifications both on account of a strong feeling that higher prices will prevail and the increasingly heavy demand from agricultural districts.

We quote, f. o. b. Chicago, as follows:

Wire nails, jobbers' carload lots, $1.88; retailers' carload lots, $1.93, retailers' less than carload lots, $1.98; painted barb wire, jobbers' carload lots, $1.93; retailers' carload lots, $1.98; retailers' less than carload lots, $2.03, with 30c for galvanizing; plain wire, jobbers' carload lots, $1.68; retailers' carload lots, $1.73.

Merchant Pipe and Tubes.—Although the excessively heavy demand for merchant pipe and tubes continues in the west, the recent action of eastern producers has not as yet been followed. Prices remain very firm, however, with a strong upward tendency and increased quotations are expected daily. Western makers have given up hope of being able to overtake the demand for the remainder of this year.

We quote, store prices, on merchant pipe and tubes, as follows:

Iron and Steel Pipe Basing Prices.

	Steel		Iron.	
	Black.	Galv.	Black.	Galv.
Butt.				
⅛ inch and ¼ inch.	69.2	48.2	62.2	41.2
⅜ inch	73.2	62.2	67.2	51.2
½ inch to 1½ inch.	76.2	67.2	70.2	58.2
Lap.				
2 inch	74.2	66.2	67.2	57.2
4½ inch to 6 inch..	75.2	66.2	58.2	59.2
Card Weight.				
7 inch to 12 inch...	72.2	61.2	66.2	55.2
Extra Strong Plain Ends.				
Butt.				
⅛, ¼, ⅜ inch.....	64.2	52.2	59.2	47.2
½ inch	69.2	57.2	64.2	52.2
2 inch to 3 inch....	74.2	62.2	....	....
Lap.				
2 inch	70.2	58.2	65.2	53.2
7 inch to 8 inch....	64.2	52.2	59.2	47.2
Double Extra Strong.				
Butt.				
½ inch	57.2	45.2	....	....
¾ inch to 1½ inch.	60.2	49.2	....	....
Lap.				
2 inch	58.2	46.2	....	....
4½ inch to 6 inch..	59.2	47.2	....	....
7 inch to 8 inch....	52.2	40.2	....	....

Tubes.

	Lap weld steel.	Charcoal iron.	Shelby seamless.
	Per cent.	Per cent.	Per cent.
1 inch	37	..	55½
1¼ to 2¼ inch.....	53	38	34
2¾ to 3¼ inch.....	63	48	44
3½ to 4½ inch.....	65½	48	44
5 to 6 inch.....	53	..	..

Cast Iron Pipe.—A number of fair contracts have been placed during the week and considerable desirable business is pending. No further advance has materialized, but on account of

the increasing strength of pig iron it may be expected in the near future. Pipe makers are not satisfied with present quotations, as it is said that they are out of line with the present prices of raw material. The city of Appleton, Wis., has placed a contract for 1,500 tons of water pipe with the United States Cast Iron Pipe & Foundry Co. Olney, Ill., will require a small tonnage of about 500 tons and the city of Dayton, O., will place a contract for 2,500 tons some time this week. Bids on 4,029 tons invited by Los Angeles, Cal., were closed on Tuesday.

We quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $30, 6 to 12 inches, $28, larger sizes, $27; gas pipe, $1 a ton higher.

Old Material.—The market for old material continues stronger and quotations on almost all items have advanced during the last week. These advances were unexpected in many quarters and are due in part to a decrease in the tonnage of railroad offerings. It is not thought, however, that the present tendency can continue for long, on account of the large amount of scrap in the possession of the railroads. Although a number of western roads have large quantities of steel rails and railroad wrought all along their lines, the scarcity of labor has prevented moving it, such labor as has been available being used for construction work. Railroad lists for the week are small, the largest being issued by the Michigan Central for 1,124 tons of miscellaneous scrap, the principal item being 91 tons of steel rails. The Chicago & Milwaukee has invited bids on 1,122 tons, which closed Tuesday. The largest items of this list were 250 tons of steel rails, 150 tons of angle bars and 150 tons of steel frog switches. Other lists include one for 812 tons issued by the Wabash, of which the principal item was 144 tons of No. 1 railroad wrought and a small list sent out by the Grand Trunk.

We quote, for delivery in consumers' yards, Chicago, as follows:

Gross Tons

Old car wheels	$13.25 to 13.75
Old iron rails	16.50 to 17.00
Rerolling rails (5 ft. and over)	14.25 to 14.75
Old steel rails (3 ft. and under)	12.50 to 13.00
Frogs, switches and guards	12.25 to 12.75
Heavy melting steel	12.25 to 12.75
Shoveling steel	12.00 to 12.50

Net Tons

No. 1 R. R. wrought	$12.75 to 13.25
No. 2 R. R. wrought	11.75 to 12.25
Arch bars and transoms	16.50 to 17.00
Knuckles, couplers and springs	12.00 to 12.50
Shafting	15.50 to 16.00
Iron car axles	21.00 to 21.50
Steel car axles	16.50 to 17.00
Locomotive tires	13.50 to 14.00
Dealers forge	10.25 to 10.75
Pipe and flues	9.75 to 10.25
No. 1 cast	11.75 to 12.25
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.50 to 8.00
No. 1 boiler cut	8.50 to 9.00
Boiler punchings	12.50 to 13.50
Cast and mixed boring	6.75 to 7.00
Machine shop turnings	7.50 to 8.00
Railroad malleable	12.50 to 13.00
Agricultural malleable	11.75 to 12.25
Angle bars, splices, etc., iron	14.25 to 14.75
Angle bars steel	11.75 to 12.25
Stove plate and light cast scrap	10.00 to 10.50

BIRMINGHAM

Stocks Reduced Despite Heavy Production

Office of THE IRON TRADE REVIEW, Birmingham, Ala., Sept. 10.

Pig Iron.—Stock returns of Sept. 1 showed an aggregate of 97,000 tons on furnace yards within the state, with the exception of charcoal iron. Of this tonnage, 53,000 tons were free foundry iron; 9,000 tons, free basic iron, and 32,000 tons of all grades in warrant yards. The reduction effected during August was but slightly more than 8,000 tons, despite the length of the month and the heavy sales made in that time; but such a condition is due largely to the distribution of the stock and the increased production, which was 8,700 tons more in August than in July, rather than to the lack of demand for prompt shipments. It is noted that several of the leading producers were forced to carry over into this month considerable tonnage already specified for delivery, while since last report a leading concern has withdrawn from the market for any delivery within the remainder of the year. The sales made within the past week involved an aggregate of 15,000 to 17,500 tons, all of which is for comparatively early shipment. In the transactions mentioned, a basis of $13 per ton at Birmingham for No. 2 foundry is the lowest price reported, while small lots of favorite brands were entered at a price 50 cents per ton higher. The sales made represented requirements in strictly southern territory, and the average price received is probably affected accordingly; however, one large concern refused orders aggregating some 10,000 tons on a $13 basis for delivery in the remainder of the year and still another refused to consider a lower price for 2,000 tons to be shipped promptly. For first quarter deliveries, there is quite a tendency to maintain a basis of $13.50 per ton at Birmingham. Such figures have no doubt checked the buying to a certain extent, but the attitude manifested by the producing interests is apparently unchanged. At present two of the largest producers are out of the market; a third offers a limited tonnage for first quarter only, and two concerns make quotations subject to prompt acceptance. The inquiries pending consist principally of 500 to 700-ton lots, for comparatively early shipment, but the demand for shipments against previous contracts is even stronger than at the time of last report. In this last, the scarcity of cars is now quite a feature. For delivery in the remainder of the year, and through the first quarter, the market is quoted as below, per gross ton, f. o. b. cars here:

For delivery during the remainder of the year:

No. 1 foundry	$13.00 to 13.50
No. 2 foundry	12.50 to 13.00
No. 3 foundry	12.00 to 12.50
No. 4 foundry	11.50 to 12.00
Gray forge	11.00 to 11.50
Mottled	10.50 to 11.00
Standard basic	12.50 to 13.00
Off basic	11.00 to 11.50
Standard charcoal	22.50 to 23.00

With the exception of charcoal iron, an advance of 25c to 50c per ton would be asked over the above figures for deliveries in the last quarter.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. has just been awarded 3,000 tons of water pipe for the requirement at Milwaukee, which will be furnished from its Anniston, Ala., plant. Recent additions to prospective lettings consist of small lots for maintenance work, but the situation as a whole is satisfactory to producers, in that the higher schedule of prices has been established. Water pipe is quoted as follows, per net ton, f. o. b. cars here: Four-inch, $24.50; 6-inch and up, $22.50 with $1 per ton extra for gas pipe.

Old Material.—The trading in this market is still light, comparatively, but a large volume of inquiries is being received. The forwarding of the week consisted principally of carload quantities of wrought and cast scrap, without changing asking prices. An inquiry for a small tonnage of relaying rails has just been submitted. The prices dealers are generally asking for their holdings, are about as follows, per gross ton, f. o. b. cars here:

Old iron axles (light)	$15.50 to 16.00
Old steel axles (light)	12.00 to 12.50
Old iron rails	12.00 to 12.50
No. 1 R. R. wrought	12.00 to 12.50
No. 2 R. R. wrought	10.50 to 11.00
No. 1 country	8.50 to 9.00
No. 2 country	6.50 to 7.00
No. 1 machinery	9.00 to 9.50
No. 1 steel	9.50 to 10.00
Tram car wheels	8.50 to 9.00
Standard car wheels	10.50 to 11.00
Light cast and stove plate	7.00 to 7.50

CLEVELAND

Pig Iron Active, Prices Advancing

Office of THE IRON TRADE REVIEW,
Penton Bldg., Sept. 10.

Iron Ore.—A strike at Allouez Bay of laborers on the Great Northern dock caused a suspension of work for three days, and this will result in a reduction of 300,000 tons in the shipments of those docks this month. The men demanded 25 cents a day increase in pay and double pay for overtime. The management offered 20 cents a day increase for both day and night crews and time and a half for overtime, and this proposition was accepted. The offer of an advance of 10 cents a ton on the ore freight rate has resulted in very little business being done, and at the present time there is a scarcity of vessels. Shippers are having considerable difficulty in tying up any vessel tonnage and their troubles are likely to increase as the season draws to a close. Owing to the strike at Allouez Bay, and the fact that September has three fewer working days than August, it is not expected that the ore movement for September will be much over 6,000,000 tons. Small tonnages of ore are still being sold and it is possible, but not probable, that some mines will increase their output and offer some ore at advanced prices before the close of the season.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $3.75; Mesabi Bessemer, $3.50; old range non-Bessemer, $3.00; Mesabi non-Bessemer, $2.85.

Pig Iron.—Demand continues active and prices are being steadily advanced. Interest centers in deliveries during the first half of next year, and for that period $16, furnace, is the price at Detroit, and it is doubtful whether this quotation could be shaded at Toledo. At Cleveland the price is $15, furnace. Owing to the difficulty in getting ore and limestone and to high quotations on coke, it does not seem probable that the production of pig iron along the lakes will be increased to any considerable extent this year. For delivery during the remainder of the year, we quote as follows, delivered in Cleveland:

No. 1 foundry	$15.50
No. 2 foundry	15.00
No. 2 southern	16.85
Bessemer	15.65
Lake Superior charcoal	16.60
Jackson co. 8 per cent silvery	18.05

Coke.—Ovens continue to experience much trouble in keeping their production up to the demand. One of the leading independent companies has advanced its quotations on foundry coke to $2.90 for delivery this year or the first half of next. Quotations on furnace coke are slightly higher. We quote as follows at the ovens:

Connellsville furnace coke, $2.30 to $2.40 for prompt delivery, and $2.25 to $2.35 on contract; Connellsville foundry coke, $2.75 to $2.90 for prompt, and 2.75 to $2.90 on contract.

Finished Material.—Demand continues brisk and mills are not catching up on their deliveries. Eastern Pennsylvania mills are quoting 1.50c, mill, on shapes for prompt shipment, and 1.40c for delivery within four to six weeks. On plates quotations are 1.40c, mill, on tank, 1.45c on universal and 1.50c on flange. The freight rate from eastern Pennsylvania mills to Cleveland is 19 cents. These mills are not willing to take any business for delivery after Jan. 1, except at prohibitive prices. The general policy of mills in the central west is to discourage buying for delivery after the first of the year. At least one company has, however, made a quotation of 1.50c, Pittsburgh, on steel bars for the first quarter of 1913. No sales are reported at that price. A leading independent company has sold 600 kegs of spikes for delivery at Detroit at $1.70, Pittsburgh.

Old Material.—A fair amount of buying is being done by steel plants, foundries and rolling mills. The embargo against the Upson Nut Co. has been lifted, and that company is again in position to handle urgent shipments. Owing to repairs that are being made at the plant, the company is not buying in any quantity. Outside inquiries for steel making scrap continue in volume, notably from Canton, O., and Sharon, Pa. Cast iron borings are in very heavy demand by a Portsmouth, O., plant. The rolling mills are all running full and are buying No. 1 busheling for later shipment. Foundries are buying freely of No. 1 cast. Relaying rails are in demand while the inquiry for light rails is good. Turnings are quiet, owing to embargoes having been placed against several plants in the Pittsburgh district. Labor conditions among dealers are growing worse, workmen being scarce. The B. & O. railroad list brought good prices. Railroad lists are numerous, the Grand Trunk having closed Sept. 10, and the New York Central, Sept. 11. The Michigan Central closes Sept. 12; Norfolk & Western, Sept. 14, and the Lake Shore, Sept. 15. We quote, f. o. b. Cleveland, as follows:

Gross Tons.

Old iron rails	$15.50 to 16.00
Old steel rails (under 6 ft.)	14.00 to 14.50
Old steel rails (over 6 ft.)	14.50 to 15.00
Relaying rails	20.00 to 20.50
Old car wheels	13.00 to 13.50
Old steel boiler plate	11.25 to 11.50
Malleable iron (railroad)	13.25 to 13.50
Steel axles	19.00 to 19.50
Axle turnings	10.50 to 11.00
Malleable iron (agricultural)	11.50 to 12.00
Heavy steel	13.00 to 13.25
Country mixed steel	11.50 to 12.00
Bundled sheet scrap	10.00 to 10.50

Net Tons.

No. 1 R. R. wrought	$12.50 to 13.00
No. 1 busheling	11.25 to 11.75
No. 1 machine cast	11.50 to 12.00
No. 1 dealers' wrought	11.00 to 11.50
Machine shop turnings	8.50 to 8.75
Pipes and flues	10.00 to 10.50
Wrought drillings	8.50 to 8.75
Cast borings	7.25 to 7.50
Stove plate	9.50 to 10.00
Wrought iron piling plate	14.50 to 15.00
Wrought iron arch bars	14.00 to 14.50

Safe-Cabinet Co.'s Open House

The Safe-Cabinet Co., Marietta, O., manufacturer of steel office furniture, held an "Open House" and demonstration of its products in that city, Sept. 2 to 7. Exhibitions of the process of manufacture were given, and fire tests were made in the presence of about 150 guests, among whom were some of the most noted fire chiefs of the country. Besides this, several entertainments in the way of banquets and outings were held, all of which were largely attended by men prominent in steel furniture and fire-fighting circles.

Ten-ton Crane Wanted.—F. L. Clore & Son, Henderson, Ky., who will remove their sawmill to Fayette, Ala., in the near future, are in the market for a 10-ton crane to be delivered there.

CINCINNATI

Pig Iron Less Active---Prices Firm

Office of THE IRON TRADE REVIEW,
503 Mercantile Library Bldg., Sept. 10.

Pig Iron.—There has not been so much activity in the market during the past week, but prices have retained their strength, and have continued gradually to advance. Two large southern producers have recently notified the trade that their price for No. 2 foundry iron is now $13.50, Birmingham, for first quarter delivery, and that their lowest quotation for this year is $13. It is also reported that a few sales have been at this higher figure, and that the furnaces have refused shipments further ahead than March. Other southern producers are holding for from $12.50 to $13, Birmingham basis, for any delivery this year, and generally for $13 for the first quarter, which, with the above quotation of $13.50, makes the usual range of 50 cents for January, February and March. The southern Ohio situation is correspondingly as strong. One of the largest producers in the Hanging Rock district has recently withdrawn from the market, and others have advanced their prices until they are now given as from $14.50 to $15, Ironton, for No. 2 foundry, for the first quarter, with the latter price in the majority. There is also more northern iron being sold in this territory at present than southern grades, mostly for next year's shipment.

Stocks in furnace yards in Alabama were reduced 7,006 tons during the month of August. On last July 31 there were 102,674 tons piled in yards in that state, and on Sept. 1, there remained 95,668 tons of which 52,450 tons are foundry iron, 33,478 tons warrant iron, and 9,740 tons, basic iron.

High silicon iron has been advanced 50 cents a ton by the Ashland furnaces, and the lowest quotation on 8 per cent silicon is now $16.50, furnace, which quotation also applies to the Jackson county makes. The Virginia Iron, Coal & Coke Co. has withdrawn from the market on No. 2X, and has advanced the price of No. 3X 25 cents a ton. The Tennessee Coal, Iron & Railroad Co. has blown in its Bessemer, Ala., stack and will make foundry iron. The Holt furnace, at Tuscaloosa, Ala., will be blown in Oct. 15, but none of this iron will be put upon the market, as it will all be used by the Central Foundry Co., the owner of the stack.

One of the leading local pig iron firms reports that it sold 8,500 tons last week in the immediate Cincinnati territory, and that most of the sales were not made from inquiries, but were quietly closed for by different melters. Other sales include 1,500 tons of southern iron in southern Ohio; 650 tons of northern iron to a local foundry; 1,000 tons of malleable in central Ohio; 1,000 tons of malleable in West Virginia; 1,500 tons of northern grades in central Ohio; 1,500 tons of southern iron, also in the central part of the state; and 1,000 tons of northern No. 2 in central Ohio. Most of the deliveries extend into next year.

Recent inquiries include 1,000 tons of northern iron from an Indiana melter; 500 tons of high silicon from a local user; 2,500 tons of northern iron from an Indiana manufacturer; 1,500 tons of northern grades from central Ohio; 750 tons of Nos. 2, 3 and 4, southern and northern iron, from central Indiana; and 400 tons of southern No. 1 soft, from a Michigan user. With freight rates $3.25 from Birmingham, and $1.20 from Ironton, we quote Cincinnati prices as follows:

Southern foundry No. 1	$16.25 to 17.00
Southern foundry No. 2	15.75 to 16.75
Southern foundry No. 3	15.25 to 15.75
Southern foundry No. 4	15.00 to 15.50
Southern gray forge	14.75 to 15.25
Mottled	14.25 to 14.75
Southern No. 1 soft	16.25 to 17.00
Southern No. 2 soft	15.75 to 16.75
Standard southern car wheel	26.00 to 26.25
Northern No. 2 foundry	15.70 to 16.20
Northern No. 3 foundry	15.20 to 15.70
Northern No. 4 foundry	14.95 to 15.20
Silveries 8 per cent silicon	16.70 to 17.00

Coke.—The coke market in this territory is inactive, but very strong. Practically no sales of any importance have been made during the past week on either furnace or foundry grades, although the inquiries, especially those for 48-hour coke, are large. Most furnaces are buying very quietly in small lots at a time, usually for not more than enough to run them over 30 or 60 days, and are still delaying the closing of their contracts for next year's requirements. There is not much demand for foundry coke, and dealers are not expecting many sales along this line before the first of the year. Some Wise county producers are not quoting less than $2.50, ovens, for furnace coke, but others are selling as low as $2.25, for either spot or contract shipment. Connellsville furnace coke still ranges from $2.25 to $2.50, ovens, Pocahontas coke is practically the same price, and New River coke from 10 to 15 cents less on spot orders. We quote below from the leading coke producing districts, as follows:

Connellsville district:	Prompt shipment.	Contract second half.
Foundry coke	$2.50 to 2.75	$2.50 to 2.75
Furnace coke	2.25 to 2.50	2.25 to 2.50
Wise county district:		
Foundry coke	$2.50 to 2.75	$2.50 to 2.75
Furnace coke	2.25 to 2.50	2.25 to 2.50
Pocahontas district.		
Foundry coke	$2.25 to 2.50	$2.25 to 2.50
Furnace coke	2.25 to 2.50	2.00 to 2.50
New River:		
Foundry coke	$2.50 to 3.00	$3.00 to 3.25
Furnace coke	2.15 to 2.35	2.25 to 2.50

Finished Material.—The local sheet mill has again advanced its prices on galvanized sheets $1 a ton over its former price, or $3 a ton over other quotations. The price now given for galvanized No. 28 is 3.30c, and black sheets No. 28 gage are being held at 2.15c, both Pittsburgh basis. The mill is also from eight to 10 weeks behind on deliveries, and has recently refused several attractive tonnages. There is a good inquiry in the market, and specifications are coming in in good order. Steel bars are still generally quoted at 1.30c, Pittsburgh basis, but occasional sales are being made in this territory, generally on small and special lots, at 1.35c. Most of the local offices of large eastern and western mills report that they are practically out of the market on all finished articles, being at present almost hopelessly behind on deliveries, and consequently there have been very few new contracts made. Structurals are quoted at 1.35c to 1.40c, Pittsburgh basis. For other prices, see Pittsburgh report.

Warehouse business continues good with prices strong and showing a tendency to rise. Stocks remain largely reduced because of the re-

cent drain upon them caused by the heavy demand, and buyers are finding it a hard matter in some cases to obtain the exact sizes of the articles wanted. We quote warehouse prices, f. o. b. Cincinnati, as follows:

Steel bars, 1.85c, base; iron bars, 1.80c, base; structurals, 2.05c, base; plates, ¼ inch and over, 2.05c base; sheets, blue annealed No. 10, 2.20c, base; rivets, cone head, 2.30c, base; cold rolled shafting, 58 per cent discount; boiler tubes as follows: 1¾ to 2¼ inch, 60 per cent discount; 2½ inch, 62 per cent discount; 2¾ to 3¼ inch, 65 per cent discount; 3½ to 4½ inch, 67 per cent discount; and 5 to 6 inch, 60 per cent discount; soft steel cold twisted concrete bars, cut to length as follows: ¾ inch square and larger, 2c; ⅝ inch square and larger, 2.10c; ½ inch square and larger, 2.20c; 5-16 to ⅜ inch square and larger, 2.40c; ¼ inch square and larger, 2.55c.

Old Material.—There is a better feeling in the scrap iron market. Prices are generally stronger, and in some cases have been slightly advanced. There is a better demand from users outside of the city than for some time, and the increased activities of the local dealers can easily be noticed. No. 1 busheling and cast borings are each quoted 25 cents higher than last week, the former at from $8.25 to $9 and the latter at from $6.50 to $7. We quote below prices dealers will pay and also dealers' selling prices in Cincinnati and vicinity as follows:

Gross Tons

Old iron rails	$12.25 to 13.00
Old steel rerolling	10.75 to 11.25
Old iron axles	17.25 to 17.75
Heavy melting scrap	10.00 to 10.50
Relaying rails	20.00 to 20.75
Bundled sheet scrap	7.50 to 8.00

Net Tons

Old No. 1 R. R. wrought	$10.00 to 10.50
No. 1 machinery cast	10.50 to 11.00
No. 1 busheling	8.50 to 9.00
Stove plate	8.00 to 8.50
Machine shop turnings	6.25 to 6.75
Cast borings	6.50 to 7.00
Heavy turnings	6.75 to 7.25
Mixed cast	9.00 to 9.50
Malleable	7.00 to 7.50

PHILADELPHIA

Eastern Market Still Gathering Strength

Office of THE IRON TRADE REVIEW, Philadelphia, Sept. 10.

Active buying of finished material still characterizes the eastern steel market where makers are booking more tonnage than they are shipping and deliveries are being extended. Premium payments of $2 to $5 a ton continue, however, in small lots of plates, steel bars and structural shapes. Eastern plate and shape makers are posting further advances in their schedules and other price rises of the week include shafting, spikes and some brands of bar iron. The week's development includes an award of 2,000 gondola cars to the Cambria Steel Co. by the B. & O. railroad. Higher forward raw material costs emphasized by recent sales of foreign ore for next year at advances are holding back eastern pig iron makers from actively seeking tonnage. The market is strong. Steel scrap has been in heavy demand and the whole old material situation is very firm.

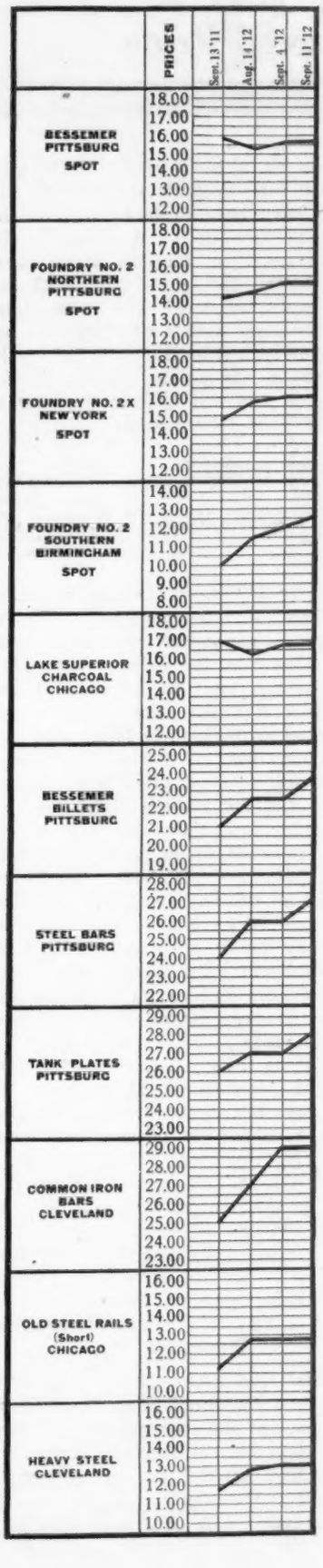
Pig Iron.—Uncertainties over raw material costs following Jan. 1 still overhang the iron market and are keeping within cautious bounds the selling for first quarter and beyond of many eastern Pennsylvania makers. A sale of Cuban ore for next year at practically 50 cents advance, as reported by THE IRON TRADE REVIEW last week, has emphasized before producers the forward cost conditions in the material that promise to prevail and has caused more definite shaping of policies. There is a general appreciation that coke will be up 25 to 50 cents, but definite word on first half requirements is awaited. With the needs of most consumers well under cover for this year and with producers reluctant to commit themselves freely after Jan. 1, the buying activity at present is slow and inquiry is moderate. The heavy recent selling and the strength of the market this year, however, are reflected by statistical reports made at the monthly meeting of the Eastern Pig Iron Association the past week. The unfilled orders at the close of August showed a heavy increase and in this respect was one of the best of the year. Stocks further declined. There is some feeling now among producers that a shortage of iron may develop in the eastern district before the close of the year. Where eastern Pennsylvania makers have quoted on foundry lots for first quarter, they have named a minimum figure of $16, furnace, for No. 2X. For this year, the range is from $15.50 to $15.75, furnace, with one or two makers quoting $16. Eastern Pennsylvania cast pipe makers are still buying iron. One of these consumers took 2,500 tons of eastern Pennsylvania forge for this year at $15, furnace. Another took 2,000 tons of No. 3 and forge for September-October, of which 1,000 tons were southern forge at $11, Birmingham, or about $15.25, delivered. Other recent sales of southern forge were made in this market at this figure, including a lot of 4,000 tons, but it is stated this price could not be duplicated by 50 cents. Considerable charcoal iron for this year is being sold in this district at the advanced price of $16.50, Buffalo. Low phosphorus iron is extremely strong. For this year makers are well sold up and have scant stocks. Standard iron is quoted at $21.50, Philadelphia, and a sale at this price of 2,000 to 3,000 tons for first half to a buyer with plants in the east and in Chicago is noted. Two makers divided this order. Recent purchases running over first half by a steel maker in this district prove to be even heavier than previously reported and reach 18,000 tons in addition to several lots of Bessemer. Basic shows no further developments. One eastern steel company continues to inquire for 6,000 tons for this year and first quarter and has been quoted $16.50, delivered, on this order. Most makers are asking this price for early or forward. The schedule of the leading Virginia makers continues $14.25, furnace, for No. 2X for last and $14 for first quarter. An advance in the lower first quarter price is soon expected. Other Virginia makers are quoting $14.25, furnace. The Princess furnace will be idle several months because of an accident. We quote for prompt and last quarter shipment to consumers' plants in Philadelphia and vicinity as follows:

Eastern Pa. No. 1X foundry	$16.50 to 16.15
Eastern Pa. No. 2X foundry	16.25 to 16.50
Eastern Pa. No. 2 plain	15.70 to 16.00
Standard gray forge	15.50 to 15.75
Basic (Eastern and Central Pa.)	16.25 to 16.50
Virginia No. 2X	17.00 to 17.25
Southern No. 2	16.50 to 17.50
Standard low phosphorus	21.00 to 21.50
Malleable	16.70 to 17.00

(First Quarter.)

Malleable	17.25
Malleable	17.00 to 17.25

PRICE CHART



Eastern Pa. No. 2X foundry...	16.70
Eastern Pa. No. 2 plain.....	16.45

Finished Material. — No improvement is to be noted in the deferred delivery schedules of eastern steel mills and new orders are still flowing in at a rate in excess of shipments. The situation in new business is so satisfactory that makers are able to be more selective in accepting tonnage and this condition is conducive to the betterment of average prices. As far as can be observed, there are no signs of weakness anywhere either in prices or in the buying strength of the market. On the contrary, the market continues to gain support and prices to advance.

Payment of premiums for delivery service still obtains, though these usually apply to small lots owing to the freer rolling schedules. Some plate orders were booked the past week by eastern mills at $5 premium. Some middle western mills also took a hand in such profitable offerings of the market and sold small lots of steel bars at 1.40c, Pittsburgh, and plates at 1.45c, Pittsburgh, for delivery in eight weeks. On contracts some leading eastern plate makers are now quoting regular customers 1.40c, Pittsburgh, for September, 1.45c for October and 1.50c for November and December. This schedule applies to sheared plates. One leading shape maker in the east is quoting 1.50c, Pittsburgh, for standard sections and is booking on this base for this year. From stock eastern mills continue to get 1.75c, mill, on shapes.

The steel bar market is so strong that makers have established extras of from $1 to $2.50 a ton for twisting concrete bars. No sellers are yet quoting steel bars for next year. The Baltimore & Ohio railroad is inquiring for 2,000 tons of plates and steel bars for this year. Two leading eastern bar iron makers have advanced to 1.40c, mill, or 1.47½c, Philadelphia, but there is considerable range in this product and some makers are still not above 1.30c, mill. A Youngstown maker has sold 2,000 tons of bar iron for this year through an eastern office at 1.45c, mill, for delivery to a western point.

Semi-finished steel is very strong. A sale of 600 tons of forging billets at $32.20, eastern Pennsylvania, or about $30, Pittsburgh, is noted. An inquiry for 1,000 tons of Bessemer billets is current. An eastern buyer out for 3,000 tons of Bessemer bars for this year has obtained quotations with difficulty. Spikes have gone up to 1.75c, Pittsburgh, for large and small sizes and shafting has been advanced 2 points or about $2 to 62 and 57 off in base territory.

The Phoenix Iron Works will furnish a small tonnage for the West Side Y. M. C. A. building, this city. The Burg store, this city, will be of concrete. Plans are being prepared for a 13-story addition to the Arcade building, to require about 1,500 tons and will soon be out for the Bergner & Engle brewery, 1,000 to 1,500 tons, both this city. No action has yet been taken on the Atlantic City pier, 1,300 tons. A building for the Peabody Institute, Nashville, Tenn., 600 to 700 tons, is up.

The Cambria Steel Co. has been awarded 2,000 gondola cars for the Baltimore & Ohio railroad.

We quote, delivered at consumers' plants in Philadelphia and vicinity, as follows:

Plain structural shapes, 1.50c to 1.60c; tank plates, 1.50c to 1.60c; steel bars, 1.45c to 1.50c; common bar iron, 1.37½c to 1.47½c; cut nails, 1.80c to 1.85c; blue annealed sheets, No. 10 gage, 1.65c to 1.70c; 4 x 4-inch open-hearth rolling billets, $24.90 to $25.50; forging billets, $30.40 to $31.40. Extras shown under Pittsburgh report. Philadelphia warehouse prices 1.85c for steel bars and 1.90c to 2.00c for plates and shapes.

Old Material. — The strength and buoyancy of heavy melting steel continues to feature the market. Dealers and the mills competed for the monthly offering of heavy steel of the Pennsylvania and other railroads closing last week and this material is understood to have gone to the former at higher than $15, delivered eastern Pennsylvania. Some dealers bid $15, delivered, and received none of the award. Recent purchases of heavy steel in the open market by eastern Pennsylvania steel makers are estimated in excess of 30,000 tons. This was well distributed, as most of the leading buyers have been in the market. On some of this tonnage, $15, delivered, was paid. We quote gross tons, delivered to consumers' plants in eastern Pennsylvania and New Jersey as follows:

Old iron rails	$16.50 to 17.00
Old steel rails (rerolling)	16.00 to 16.75
No. 1 heavy melting steel	14.75 to 15.00
Old car wheels	14.25 to 14.50
Old iron axles	24.00 to 25.00
Old steel axles	18.00 to 18.50
No. 1 railroad wrought	16.50 to 16.75
Wrought pipe	13.25 to 13.50
Cast borings	10.00 to 10.50
Machine shop turnings	11.00 to 11.50
Heavy cast	13.75 to 14.25
Malleable	12.50 to 13.00
Stove plate	10.75 to 11.25
No. 1 forge	12.75 to 13.25
Low phosphorus	17.50 to 18.00

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J., $1.10 to Pottsville, Pa.; Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg and Steelton, Pa.; $1.40 to Milton, Pa.

NEW YORK

Second Sale of Cuban Ore at Advanced Price

Office of THE IRON TRADE REVIEW,
1115 West Street Bldg., Sept. 10.

Iron Ore.—The report of a round sale of Cuban ore for next year's delivery, the first transaction for that period yet made, as announced in THE IRON TRADE REVIEW last week, stirred eastern furnace men to a more thorough appreciation of the higher forward market on raw materials that confronts them. Some further negotiations for next year's ore have since been instituted. The advanced price paid in this transaction has tended to crystallize the sentiment of ore sellers in adopting higher schedules. Following the sale of Bessemer ore reported, a block of 12,000 tons of El Cuero, Cuban, low phosphorus ore for January and February delivery has just been purchased by an eastern Pennsylvania furnace at 9½c per unit, f. o. b. Philadelphia, which represents an advance of ½ cent per unit, equivalent to about 30 cents a ton over the last sale of this material for this year, made about a month ago. This sale illustrates the higher forward values that will also rule on special ores. Trans-Atlantic freights continue high and strong and vary with practically each charter so that sellers of such foreign ores are scarcely able to approximate unit quotations, although 8 cents per unit, Philadelphia, is now asked on the commoner European furnace ores.

Pig Iron.—While the movement is not quite so marked, consumers of iron in the New York and adjacent districts, continue to close liberally for requirements for this year and first quarter. In some cases, sales extend over the first half. Some producers, particularly those in eastern Pennsylvania, are inclined to hold back somewhat on selling freely for first quarter and first half, owing to the higher raw material costs in prospect and these policies are keeping down the booked tonnage. Nevertheless, there has been considerable eastern Pennsylvania iron sold for first quarter and in some cases beyond on the basis of $16.00, furnace, for No. 2X and $15.75 for No. 2 plain and $15.50 for No. 3. One leading Lehigh valley maker today advanced its schedule to $16, furnace for No. 2X for the year and to $16.50 for first quarter. Certain brands, however, have still been offered for first quarter at $15.50, furnace, in limited quantities. These conditions present a tidewater market for first quarter of $16.20 to $16.70, for No. 2X. The interior New England market for this year ranges from about $17.25 to $17.50, for No. 2X and from about $17.35 to $17.75 for first quarter. One seller in the Pittsburgh district has been offering iron in New England slightly below $17.00, delivered. The leading Virginia maker this week announced that it has withdrawn from the No. 2X market for this year, which it has been holding at $14.25, furnace, and has advanced No. 2 plain to $14.00 and lower grades to $13.75, furnace. Today it posted another advance for first quarter to $14.25, furnace, for No. 2X, but No. 2 plain and lower grades remained unchanged at $13.75 and $13.50, respectively. Sales of the week include 2,000 to 3,000 tons of No. 2X and a lot of off malleable for deliveries running into first quarter for a Connecticut valve maker; 1,800 tons of No. 2X and No. 2 plain for a New Jersey machinery builder for last quarter at prices of $15.50 and $15.25, respectively, eastern Pennsylvania furnaces; about 3,000 tons of No. 3 and 2 plain to a pipe shop in this district for first quarter and first half and a good tonnage of smaller sales. The leading pump maker is still buying against inquiries for 4,000 to 5,000 tons for Holyoke, Mass., and Harrison, N. J., for first half. A radiator manufacturer has closed against inquiries for 2,000 to 4,000 tons of No. 2X and high silicon iron for this year's delivery to New England and western Pennsylvania plants. Pending inquiries include 1,000 tons of 2X for last half or first quarter for a Brooklyn consumer. A Newark, N. J., buyer is out for 500 to 700 tons of No. 2X for first quarter and another New Jersey consumer for 600 tons. A St. Louis steel maker which recently bought a round tonnage of southern basic is in the market through eastern offices for 6,000 tons additional for delivery through January. One seller in the Buffalo district has considerable tonnage for this year to offer at $15, furnace, for No. 2X, but for first quarter the market holds firmly at $15.25, furnace. Some sales of No. 2 plain for first half New England delivery have been made on a basis of $15.25, Buffalo. Small sales of Buffalo 3 per cent silicon have been made in this district at $15.75, furnace. A break in the Erie canal at Bushel's Basin, near Rochester, during the past week has seriously interfered with barge shipments from Buffalo and promises not to be repaired until shortly before the close of navigation. We quote for prompt and last quarter shipment at New York tidewater, as follows:

Northern foundry No. 1	$16.70 to 16.95
Northern No. 2X foundry	16.20 to 16.70
Northern No. 2 plain	15.95 to 16.20
No. 2 Virginia	17.25 to 17.50
No. 2 southern foundry	17.00 to 17.50
Malleable	16.75 to 17.00
Gray forge	15.50 to 15.75

Ferro-Alloys. — Leading English makers of ferro-manganese effective Sept. 7, announced another advance of $3 a ton for delivery after Jan. 1, to the basis of $56.50, seaboard. This brings the price of ferro-manganese to the highest level since September, 1907. A sale of 100 tons at the new forward price is announced. All English makers have not yet formally posted the new advance, but are expected to do so without delay, as they have withdrawn the former price of $53.50. Considerable selling of forward ferro-manganese was done at the $53.50 price before its withdrawal, one seller having taken about 7,000 tons. Ferro for shipment this year is very strong and sales have been made at $58.50, seaboard. One seller is now holding at $65, seaboard. Makers of 50 per cent silicon are heavily booked for this year, but have not yet opened their books for first quarter. This material is very strong. An inquiry for 300 tons of spiegeleisen for this year is pending. We quote standard English 80 per cent ferro-manganese at from $58.50 to $60 for early shipment and at $56.50, seaboard, for delivery after Jan. 1 and 50 per cent ferro-silicon at $72.50, Pittsburgh.

Cast Iron Pipe.—There is an active demand for small pipe at advancing prices, but the movement in the larger sizes is still lagging. Prices are inclining upward, but the advance is coming irregularly. Public lettings are few. The Warren Foundry & Machine Co. has taken 250 tons of

4-inch for Russell, Mass. We quote 6-inch pipe at from $23 to $24, f. o. b. New York, in carload lots.

Finished Material.—With practically all makers east and west well booked ahead, prompt deliveries on any tonnage of size are out of question but where smaller orders can be put through rolling schedules, sharp price advances continue to be gained. The market throughout shows great strength at the official price of 1.40c and many sales are being made without deference to so-called official prices. The price determining factor appears to be how badly a buyer needs the tonnage and how much he is willing to pay for the accommodation. Plates and shapes in this market are selling in numerous cases at $1 and $2 above the so-called official price of 1.40c, Pittsburgh, and some makers are getting these advances not only for early but for forward deliveries. None of the leading steel bar makers are openly selling for first quarter and have very little tonnage to offer for this year. Bar iron is rising, but in an irregular fashion. Semi-finished steel in this territory is very strong and forging billets have sold around $30, Pittsburgh.

Fabricating prices for prompt shipment are good, but on routine business for more extended delivery the margin of profit is still not very large. Competition by fabricators with some of the eastern mills with small shops still frequently develops comparatively low prices. Some business of this character has been lately booked by mill shops around 1.75c, mill.

The situation in awards is only fair. Levering & Gerrigues have 1,000 tons for a loft on East Thirty-ninth street and 300 tons for the Christian Workers' Home, Grammercy Park; Milliken Bros., Inc., 400 tons for a loft on East Fifty-fourth street; Ravitch Bros., 600 tons for the St. Johns Realty loft, Forty-seventh street; American Bridge Co., 800 tons for the office building of W. R. Grace & Co., at Old Slip, Water and Pearl streets; 500 tons for a loft of Milliken Bros., Inc., on West Thirtieth street; National Bridge Co., 300 tons for the New York and Queens Electric Light & Power Co. building, Long Island City; De Moines Bridge & Iron Co., 600 tons for United States post office and custom house, Moskogee, Okla., Toledo, Bridge & Crane Co., 450 tons for three bridges over South Chicago Avenue, Chicago, for the Baltimore & Ohio Railroad; American Bridge Co., 250 tons for a transfer bridge at Baltimore for the Baltimore & Ohio Railroad; Boston Bridge Works, 120 tons for a bridge for the Boston, Revere Beach & Lynn Railroad and Vanderstuken & Ewing Construction Co., 120 tons for signal bridges for the Central of New Jersey railroad. Bids have gone in for a station viaduct for the Boston & Maine at Lynn, Mass., 1,500 tons. General contractors are bidding today on another section of the Lexington avenue subway on the lower part of Manhattan, about 2,000 tons. Bids go in Sept. 12 for two additional sections of the Fourth avenue subway, Brooklyn, and on Sept. 13 for a section in the Bronx. Another section will follow for bids shortly after. No action has yet been taken on the award of the large tonnage for the Brooklyn Rapid Transit Co. elevated extensions. The Herzog apartment at Eighty-seventh street and Central Park West, 700 tons, is up for bids. The award is about to be made on the Elkan Realty Co. apartment, Eighty-fifth street and West End avenue, 1,200 tons. The Pennsylvania Steel Co. has taken 6,000 tons of rails from an eastern road for delivery this year. We quote, delivered at New York tidewater, as follows:

Plain structural shapes, 1.56c to 1.66c; tank plates, 1.56c to 1.66c; steel bars, 1.46c to 1.51c; common iron bars, 1.35c to 1.40c; steel bars from store, New York delivery, 1.90c; plates and shapes from store, 2.05c; extras as shown under Pittsburgh report.

Old Material.—The market shows a lively demand, usually in small lots, apart from the heavy steel purchases of eastern Pennsylvania steel makers, but the aggregate tonnage moving is not large. The eastern steel works which have been buying heavy melting steel at $14.75 to $15, delivered, are now less active in the market. The iron mills are buying in small lots, usually wrought pipe, and railroad wrought. Cast continues dull and offers of consumers are on a low level. One buyer in this district has been in the market for 1,200 tons of heavy cast. We quote, gross tons, prices New York dealers will pay at tidewater, as follows:

Old car wheels	$11.75 to 12.00
Old iron axles	20.00 to 21.00
Steel axles	15.50 to 16.00
Old steel shafting	14.50 to 15.00
No. 1 heavy melting steel	12.25 to 12.75
No. 1 R. R. wrought	14.00 to 14.25
Wrought pipe	10.25 to 10.75
Cast borings	7.75 to 8.00
Machine shop turnings	8.75 to 10.00
Heavy cast	10.75 to 11.00
R. R. malleable	10.75 to 11.00

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City, and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixvillt, Pa., and Reading, Pa., $1.50 from Jersey City, and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City, and $1.60 from New York; to Roebling, N. J., $1.00 from Jersey City, and $1.50 from New York; to Milton, Pa., $1.60 from Jersey City, and $2.00 from New York; to Jersey City, $1.00 from New York; to Newark, $1.10 from New York.

ST. LOUIS

Moderate Pig Iron Tonnages Moving

Office of THE IRON TRADE REVIEW,
St. Louis, Sept. 10.

Pig Iron.—New inquiries are out today for 2,000 tons of southern coke iron for delivery over the first half of next year, and for 600 tons of the same grade for same delivery. The market is not quite as active as it was last week, but there is considerable to be done in the way of closing outstanding inquiries. Southern No. 2 is quoted at $13, Birmingham basis, for delivery over the remainder of the year, and at $13.50 for first quarter delivery. Northern No. 2 is quoted at $15, Ironton. Our tabulated prices on southern iron, delivered, to which the Birmingham freight of $3.75 has been added, follow:

Southern No. 1	$17.25 to 17.75
Southern No. 2	16.75 to 17.25
Southern No. 3	16.25 to 16.75
Southern No. 4	15.75 to 16.25

Coke.—Very little is being done in coke, and prices are unchanged as follows:

We quote 72-hour Connellsville foundry grades, $2.50 to $2.75 for immediate shipment or delivery through the year; 48-hour Connellsville furnace, $2.25 to $2.40; best 72-hour Virginia foundry, $2.50 to $2.75; 48-hour Virginia furnace, $2.00 to $2.40. The freight to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Finished Material.—The Manufacturers' Railway Co. (Busch terminal at St. Louis) announces today that it will spend $250,000 in terminal improvements and extensions. Plans for new engine and machine shops to cost $188,000 have been prepared, and the contract will be let as soon as President George F. Moore returns to the city a week hence. Work was started today on five freight yards the company is establishing in South St. Louis. The United Railways Co. is asking for bids for the construction of a new power house, that will require about 100 tons of steel, the Frisco railroad is in the market for a 90-foot turntable, and the Wabash is figuring on

a locomotive and machine shop at Decatur, Ill.

Old Material.—The market is somewhat more active than it has been recently, but prices are unchanged as follows:

Gross Tons.

Old car wheels	$14.50 to 15.00
Old iron rails	15.25 to 15.50
Re-rolling rails (5 ft. and over)	12.50 to 13.00
Old Steel rails (3 ft. and under)	11.50 to 12.00
Light section relayers (45 lb. and under) subject to inspec.	21.50 to 22.50
Relaying rails, subject to inspec.	23.00 to 23.50
Frogs, switches and guards	9.50 to 10.25
Heavy melting steel	11.00 to 11.50
Shoveling steel	9.75 to 10.25

Net Tons.

No. 1 railroad wrought	$11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Arch bars and transoms	13.25 to 13.50
Knuckles, couplers and springs	9.50 to 10.00
Shafting	13.00 to 13.50
Iron car axles	18.50 to 19.00
Steel car axles	16.50 to 17.00
Locomotive tires	10.50 to 11.00
No. 1 country wrought	9.00 to 9.50
Pipe and flues	8.00 to 8.50
Tank iron and cut boilers	8.00 to 8.50
No. 1 cut busheling	9.50 to 10.00
No. 2 cut busheling	8.50 to 9.00
Cast and mixed borings	6.75 to 7.25
Machine shop turnings	7.50 to 8.00
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.00 to 9.50
Stove plates	8.50 to 9.00
Angle splice bars (iron)	10.75 to 11.50
Angle splice bars (steel)	9.00 to 9.50

BUFFALO

Mills Swamped With Specifications

Office of THE IRON TRADE REVIEW,
Buffalo, Sept. 10.

Pig Iron.—The placement and inquiry for the past week approximated the tonnage of the previous week. The furnaces here booked fully 25,000 tons and there remains to be closed inquiries for upwards of 12,000 tons. The furnaces are now more intent upon getting out orders specified than in selling. Every stack in the district is practically swamped, requiring constant effort to keep their furnaces up to their highest capacity. Considerable No. 1X has been sold in New England and other points east at the maximum price of $15.75; the top price being readily obtainable on iron for last quarter delivery and early into the first quarter of 1913. This year's deliveries are fast demanding a premium readily offered by consumers finding their requirements low. The low silicon irons are commanding rigid prices owing to the pressure of the demand. One interest has set $15.25 as the minimum on any grades, including gray forge and No. 3 foundry, marking the only change in the range, f. o. b. Buffalo, for the week as shown below:

No. 1X foundry	$15.50 to 15.75
No. 2X foundry	15.25 to 15.50
No. 2 plain	15.00 to 15.25
No. 3 foundry	15.00 to 15.25
Gray forge	15.00 to 15.25
Malleable	15.50 to 15.75
Basic	15.25 to 15.50
*Charcoal	16.50 to 18.00
*Some grades and brands	20.00

Finished Material.—The piling up of orders on the books of the mills continues. The producers are swamped. Deliveries over the remainder of the year are practically impossible in most lines. With certain interests, delivery dates have been advanced to Feb. 1 on structurals. Efforts of buyers to come in for additional material for this year as well as to cover for the first quarter of the new year, have been met by a disinclination on the part of the mills to take on additional tonnage.

The Severn Engineering Co., Ithaca, N. Y., is low bidder on the new Ithaca high school, requiring 750 tons. Bids will be opened Oct. 1 for the A. E. Klopp building, Main and Tupper streets, Buffalo, three stories and basement, 65 x 100, Colson & Hudson architects.

Old Material.—The local market, while changing little during the week, showed slightly increased strength. The fencing attitude between consumers and dealers continues but the latter are holding fast to their schedules, banking on a turn for better prices. Some favorable tonnage sales softened heavy melting a point during the week.

We quote, in gross tons, f. o. b. Buffalo, as follows:

Heavy melting steel	13.25 to 13.75
No. 1 railroad wrought scrap	13.75 to 14.50
No. 1 R. R. and mch. cast sc'p	13.50 to 14.25
Old steel axles	15.75 to16.50
Iron axles	22.50 to 23.00
Car wheels	13.75 to 14.25
Railroad malleable scrap	12.50 to 13.00
Wr'ght iron and soft steel turn.	8.25 to 8.75
Cast iron borings	7.75 to 8.25
Low phosphorus steel scrap	16.00 to 16.75
Old iron rails	15.25 to 15.75
Tank iron	10.25 to 10.50
Boiler plate, sheared	14.25 to14.75
Pipe and tank	9.75 to 10.25
Stove plate	11.25 to 11.75
Sheet iron	7.25 to 7.75
Locomotive grate bars	11.25 to 11.50

The General Briquetting Co., New York, is installing at the works of the Lackawanna Steel Co., Lackawanna, N. Y., the Schumacher briquetting process, which the company controls in this district, for the briquetting of blast furnace flue dust. It is expected to have this installation in operation early next month.

METAL MARKETS

New York

Sept. 10.

Copper.—This market has been rather quiet during the past week, but there does not seem to be much ground for some statements made during the past few days to the effect that the market is considerably weaker in tone. Electrolytic is held at 17.75c, 30 days delivery, and 17.65c to 17.70c, cash. There have been a few sales of electrolytic at 17.57½c, 17.60c and 17.62½c of late, and these have probably been responsible for the recent bearish reports. These sales, however, were not of such a nature as to influence the general market. Lake copper is unusually active and appears to be sold well into November. Lake is held firmly at 17.75c, cash. Casting copper is held at about 17.50c. The close in London today was £78 10s for spot and £79 5s for three months, compared with £78 18s 9d for spot and £79 7s 6d for three months a week ago. Copper exports since Sept. 1 are 3,086 tons.

Tin.—This metal continues to advance in price and the close in London today was £220 10s for spot and £217 15s for three months, compared with £216 15s for spot and £214 5s for three months a week ago. Spot tin sold in New York yesterday at 48c, and 25 tons each of January, February and March tin were sold at 47c, thus showing that the trade in general does not expect any great recession from the present level. The closing price of tin in New York today was 48.12½c bid and 48.25c asked. About 75 tons of September were sold today at 48.15c and 48.20c. Arrivals of tin since Sept. 1 are 1,775 tons, while 2,351 tons are afloat.

Antimony.—Cookson's is held at 8.60c, Hallett's at 7.87½c, Hungarian at 7.75c and Chinese at 7.75c. The market remains dull.

Chicago

Sept. 9.

New Metals.—The demand for new metals in this territory is quite active, the most interesting feature of the situation being the continued advances in spelter. Copper remains practically unchanged, and lead is slightly weaker.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

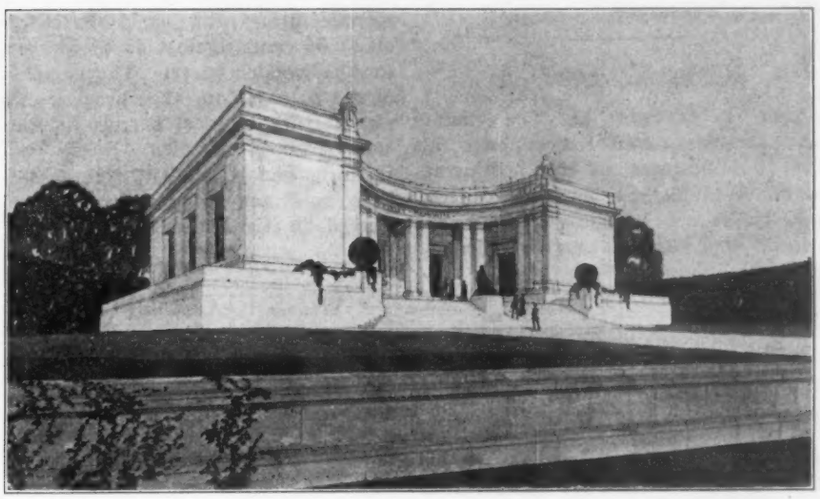
Lake copper, carload lots, 17½c; casting, 17½c; smaller lots, ¼c to ¾c higher. Spelter, car lots, 7.20c; lead, desilverized, 4.80c in 50-ton lots; corroding, 5.05c; sheet zinc, 8.75c, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 47.12c; Cookson's antimony, 8⅝c; other grades, 7⅝c.

CAMPAIGN CLOSES

This Week for McKinley Memorial Fund.

The campaign to raise a fund for the proposed McKinley memorial, at Niles, O., will close this week. Between $15,000 and $20,000 are needed to complete the fund and every effort is being made to secure the necessary subscriptions.

Colonel Wells, New York architect, has submitted to Joseph G. Butler Jr., Youngstown, O., president of the McKinley Birthplace Memorial Association, a sketch of the proposed memorial to the late president, the accompanying cut being a reproduction of the sketch. As planned by Col. Wells the building would probably be built of granite on the exterior, with marble interior finish. The memorial is intended to be of practical use to the people of Niles. A curved loggia leads to the main entrance, a place being provided for tablets to McKinley's contemporaries in the Mahoning valley. Directly in the rear of the loggia would be an auditorium with 420 seats without a gallery. A stage is provided in the auditorium and a gallery could be built if desired. Rooms for the Niles public library are proposed to the left of the entrance, and relics of McKinley would be placed in the Memorial Hall to the right.



PROPOSED McKINLEY MEMORIAL AT NILES, O.

Allis-Chalmers Stock.—The date for payment of the remainder of 90 per cent of the Allis-Chalmers preferred stock assessment of 20 per cent and of the common stock assessment of 10 per cent remains indefinite. The preferred stock assessment, calling for $18 per share and the common stock calling for $9 were set for any date after Oct. 1, on 30 days' notice. Such notice has not been given. The probability is that no payment will have to be made before Nov. 1 and possibly not before Dec. 1. This date will be fixed at a meeting of the reorganization committee. Members of the committee say that the calling of a meeting to fix a day of payment is indefinite.

RESUME HEARINGS

At Pittsburgh Oct. 1, In Steel Corporation Suit.

It has been decided by the government counsel in the United States Steel Corporation dissolution suit to recommence the public taking of testimony on Oct. 1. Hearings will be opened on that date in Pittsburgh and will be held in that city for a period of about a month.

Following that, the government hearings will be held in Cleveland, Chicago and Washington, after which they will be resumed in New York. It is expected that they will last until well into the coming spring. After that, the Steel Corporation counsel will hold another series of hearings.

H. V. Colton, of government counsel, left last week for Pittsburgh in order to make preparations for the coming hearings. His headquarters in that city are established at room 308, in the Federal building.

Anthony Schnier, aged 81, and president of the Smith, Meyer & Schnier Co., 621 to 627 W. Front street, Cincinnati, manufacturer of machinery, died at his home, 978 Hawthorne avenue, that city, Sept. 7, after an illness of six weeks. Mr. Schnier was one of the oldest members of the machinery industry in that city.

INTERESTING SUBJECTS

To Be Discussed by Foundrymen at Buffalo.

An extensive program of interesting papers on practical subjects relating to foundry work has been prepared for the annual meeting of the American Foundrymen's Association, which will be held in Buffalo, beginning Tuesday, Sept. 24.

The list of papers follows:

"The Economic Side of the 12-Hour Shift in the Steel Foundry," by R. A. Bull.
"Notes on Close-Grained Soft Cast Iron," by John J. Porter.
"Sherardizing," by Thomas Liggett, Jr.
"Instruction in Foundry Practice at the Wentworth Institute," by Prof. E. A. Johnson.
"Mystery vs. Chemistry in Grading Pig Iron," by Thomas D. West.
"Malleable Cast Iron and the Open-Hearth Furnace," by G. A. Blume.
"Compressed Air—A Foundry Necessity," by Arthur F. Murray.
"The Great Economies Produced by Continuous Foundry Installations," by Geo. K. Hooper.
"Government Cupola Melting Tests," by A. W. Belden.
"Rational Cupola Practice," by Richard Moldenke.
"The Importance of Dispatching in the Foundry," by C. E. Knoeppel.
"Mechanical Sand Tempering," by V. E. Minich.
"The Heating and Ventilating of the Foundry," by W. H. Carrier.
"Some Salient Points of the Modern Steel Foundry," by Samuel R. Robinson.
"The Foundry and the Pig Iron Market," by A. I. Findley.
"Patternmaking," by James Glass.
"The Recovery of Shot Iron in Smaller Foundries," by S. A. Capron.
"Lighting Fires in Cupolas," by A. H. Stein.
"The Economical Cleaning of Castings," by B. H. Reddy.
"The Effect of Titanium on Converter and Open-Hearth Steel Castings," by Bradley Stoughton.
"The Bonus System as Applied to the Finishing Department of a Steel Foundry," by A. W. Gregg.
"Open-Hearth Design and Manipulation as Applied to the Foundry," by John Ploehn.
"The Detachable Open-Hearth Furnace," by W. M. Carr.

Committee reports to be presented include those dealing with industrial education and analysis of coke. A report also will be made on the cast iron discussion at the International Testing Congress, recently held at New York City. A paper also is to be presented entitled "Some Short Cuts in the Foundry Laboratory."

Secures Contract

After a sharp fight in the city council, the Lorain Steel Co., Johnstown, Pa., was awarded the contract for supplying steel rails to Manchester, Eng. The company's tender was £10,231 ($51,155). This was £807 ($4,035) less than the bid of the nearest competitor, an English concern.

Damage estimated at $20,000 was done by fire, Sept. 7, at the works of the John C. Kupferle Foundry Co., St. Louis.

LARGER INCREASE

In New Orders Booked by the Steel Corporation.

New bookings of the United States Steel Corporation during August were 206,296 tons in excess of shipments, which is the largest monthly increase to be recorded since April of the present year. According to the public announcement made Sept. 10, the booked orders on Aug. 31 were 6,163,375 tons. This compares with 5,957,079 tons on July 31. The tonnage figures are still below the high market of the past five years on Sept. 30, 1907, when 6,425,008 tons was reported.

Since the plan of making monthly statements of unfilled tonnage has been followed by the Corporation, the statements of business on hand, the tonnage and percentages of increase or decline from the previous month, have been as follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Aug. 31, 1912....	6,163,375	206,296+	3.46+
July 31, 1912....	5,957,079	149,773+	2.58+
June 30, 1912....	5,807,346	56,363+	0.98+
May 31, 1912....	5,750,983	86,983+	1.52+
Apr. 30, 1912....	5,664,885	360,044+	6.97+
Mar. 31, 1912....	5,304,841	149,359—	2.79—
Feb. 29, 1912....	5,454,200	74,479+	1.38+
Jan. 31, 1912....	5,379,721	294,960+	5.71+
Dec. 31, 1911....	5,084,761	942,806+	23.24+
Nov. 30, 1911....	4,141,955	447,627+	12.06+
Oct. 31, 1911....	3,694,328	83,011+	2.25+
Sept. 30, 1911....	3,611,317	84,668—	2.34—
Aug. 31, 1911....	3,695,985	111,900+	3.33+
July 31, 1911....	3,584,085	223,027+	7.16+
June 30, 1911....	3,361,058	247,871+	7.96+
May 31, 1911....	3,113,187	105,617—	3.28—
Apr. 30, 1911....	3,218,704	228,597—	6.63—
Mar. 31, 1911....	3,447,301	46,758+	1.37+
Feb. 28, 1911....	3,400,543	289,624+	9.31+
Jan. 31, 1911....	3,110,919	436,162+	16.30+
Dec. 31, 1910....	2,674,757	85,656—	3.09—
Nov. 30, 1910....	2,760,413	111,536—	3.88—
Oct. 31, 1910....	2,871,949	286,157—	9.12—
Sept. 30, 1910....	3,159,106	379,088—	10.74—
Aug. 31, 1910....	3,537,128	433,803—	10.92—
July 31, 1910....	3,970,931	286,863—	6.72—
June 30, 1910....	4,257,794	.....	.....

Rebuilding Damaged Stack

Repair work is now under way upon the Princess furnace at Glen Wilton, Va., which was badly damaged by the collapsing of the shell Sept. 1. It is expected that the furnace will be idle about three months pending the rebuilding. The shell gave way without warning about 15 feet above the mantle, causing the entire top to topple over upon the cast house. The blowing engines remaintained intact, but the downcomer and hoist were badly damaged. From the mantle down the construction remained intact, but the downcomer will now be rebuilt along its original lines from that point.

Locomotives Ordered.—The Minneapolis, St. Paul & Sault Ste. Marie railway has placed an order for 10 superheater consolidation freight locomotives with the American Locomotive Co. The Rural Valley railroad has also ordered one consolidation freight locomotive from the same builder.

TWISTING EXTRAS

Now Being Quoted By Makers On Concrete Bars.

Manufacturers of steel bars have recently put into effect a schedule of extras for twisting of concrete bars. Until the last several weeks, concrete bars were sold at base prices without charge for twisting and the establishment of a schedule of extras reflects the strength of the present steel bar market. The schedule of extras for twisting over the base price now in effect is as follows: ¾-inch and larger, $1 per net ton; ½ and ⅝ inches, $2 per net ton; smaller, $2.50 per net ton.

Rumor Not Credited

New York, Sept. 11.—The rumor that James J. Hill may engage in the steel business in the northwest is not credited in high steel circles. Mr. Hill has recently stated to friends that his business is railroading and mining of ore and he inferred steel making is not in his line.

More Open Hearth Furnaces

New York, Sept. 11. (By wire.) — Appropriations have been made by the United States Steel Corporation for building two additional open-hearth furnaces at the Clairton plant of the Carnegie Steel Co. No official announcement has yet been made of contemplated improvements of the National Tube Co. at Lorain.

Oil Country Pipe Will Advance

Pittsburgh, Sept. 11. (By wire.)—Makers of steel oil country goods including tubing and casing are contemplating an irregular advance of $2 and $4 a ton, which probably will be announced before the end of the week.

Iron pipe makers have not changed quotations, although some manufacturers are quoting $2 a ton above the official list. The new list of the National Tube Co. on steel boiler tubes has been adopted by other boiler tube makers and a new card on iron boiler tubes carrying an advance of $2 a ton is expected this week.

STEEL BARRELS

To Be Made By Newly Organized Company.

For the purpose of manufacturing steel barrels, steel kegs and steel crates for shipment of various products, the Steel Package Co., New York, has been formed. It is capitalized for $2,500,000 preferred stock and $7,000,000 common stock. Lewis Nixon is president of the company. Other directors are: John M. Cranor, Richmond, Va.: Joy Morton, Chicago; H. L. Sprague, Jacob Ruppert, M. C. Roebling, of John A. Roebling's Sons, and Sir William Van Horne.

The corporation owns patents covering a steel barrel made up of steel staves, locked together by a device, and with hoops and heads also of steel. It is alleged that the cost of manufacturing the steel barrel is about 35 cents against 45 to 50 cents for the wooden barrel. The company owns patents on the process and manufacture of steel barrels in England, France, Sweden, Russia and Japan. The Canadian rights have been sold and a company is being formed in Canada.

WINS RECOGNITION

In Foreign Lands—Gold Medal to be Awarded by Museum of Safety.

It is announced that the Allegemeine Electricitaets Gesellschaft, of Berlin, has placed at the disposal of the American Museum of Safety the Rathenau gold medal for award annually for the best device or process for safeguarding life and limb or of promoting health in the electrical industry. The competition is open to the world and the only condition attached is that the device or process must be exhibited at the American Museum of Safety, New York City. The Rathenau medal was presented to Dr. Emil Rathenau, president and founder of the Allegemeine Electricitaets Gesellschaft on his 70th birthday, for his illustrious services as an electrical engineer. One medal will now be cast each year from one die for the American Museum of Safety to award. This is the first time that high European attention has been given to the American institution and indicates the advancing standard of the museum among the like organizations of the old world.

The Tennessee Coal, Iron & Railroad Co. will blow in its No. 1 stack at Bessemer, Ala., Sept. 15.

Manufacture of Copper-Clad Steel Products

Description of the Duplex Metals Co.'s Process of Welding Copper and Steel—The Plant and Its Equipment

Welding steel and copper on a commercial basis, until recent years, was considered impossible of accomplishment. To obtain wire satisfactory for transmitting the electric current, many attempts have been made to combine the use of steel and copper in such a manner as to secure the benefit of the strength of the former and the conductivity and durability of the latter. In the 60's, Farmer & Milliken wrapped a strip of copper around a steel wire and then tinned the combination. In 1880, Martin, in France, made bimetallic wire by casting a sleeve of copper around the middle of a steel ingot, and passing it through rolls so that the copper spread in both directions on the steel, thus producing a rod which afterwards was drawn into wire. In the 90's the John A. Roebling's Sons Co., Trenton, N. J., attempted the manufacture of bi-metallic wire by rolling a copper tube on a steel billet. Other attempts also were made, including the plating of a copper coating on steel wire.

The Monnot Process

The manufacture of copper-clad steel wire and wire products in which the copper and the steel are actually welded together, was accomplished only recently. The process by which this was reduced to a commercial possibility, was discovered by John Ferreol Monnot, who came to this country from France in 1902, after having spent many years in connection with Martin's work in that country. The discovery of this process by Mr. Monnot lead to the organization, in the latter part of 1905, of the Duplex Metals Co., which first leased, and, a year later, purchased the rolling mill of the Chester Iron & Steel Co., Chester, Pa. Since the formation of the Duplex Metals Co., this plant has been considerably enlarged, the capacity approximately having been doubled during each of the last few years. The new plant, just erected on the old site, has a capacity of about 25,000,000 pounds of copper-clad products a year.

The raw materials which form the basis of the Duplex Metal Co.'s products are steel billets and electrolytic copper ingots. These are delivered in cars which enter the plant on a siding paralleling the main building. At one end of this structure is the coating department, to which the steel billets and copper ingots are delivered. The billets are uniformly 6 x 6 inches in cross-section and 26 inches long, and vary in composition according to the use of the finished product. The first operation to which each billet is subjected is the drilling and tapping of a hole in the center of one end. Into this hole, a steel rod, threaded on both ends, is screwed in order to facilitate the handling of the billet. The billet is next immersed in an acid solution to remove the scale. After sufficient pickling, the billet is washed and heated in an oil-burning furnace.

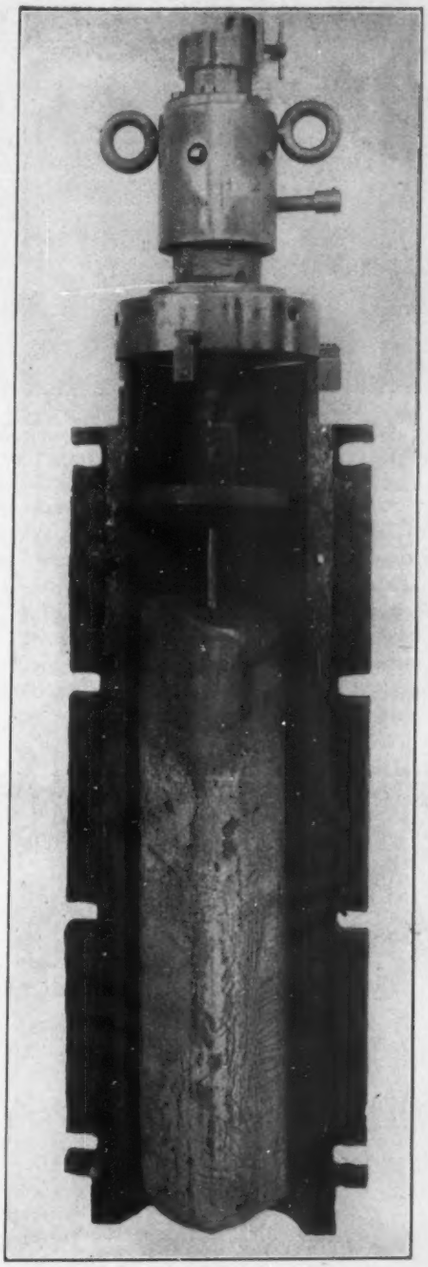


FIG. 1 — ONE-HALF OF THE MOLD, SHOWING THE METHOD OF CENTERING THE STEEL BILLET PRIOR TO IMMERSION IN MOLTEN COPPER BATH

The proper regulation of the temperature of the billet as it passes through the various manufacturing operations, is claimed by the company to be the most important factor entering into the process and details as to the degrees of heat intensity are trade secrets. After the billet has been heated to the required temperature in the pre-heating furnace, a circular plate or bushing is screwed on the rod in the end of the billet. Into the top of the bushing is screwed another rod which has an S-shaped end. A square, cast steel mold is next placed around the billet, the two halves of the mold being bolted together. The top of the mold is then inserted in a three-jaw chuck. Through the center of the chuck extends a rod which can be moved vertically. The S-shaped end of the rod attached to the circular plate or bushing is clamped into a socket in the end of the rod protruding through the chuck and the mold is completed and ready for the next operation. The function of the bushing is to center the billet in the mold.

Immersing Steel Billet in Copper

The rod, which is screwed into the billet in the mold is attached to an electric hoist, which runs overhead on a channel rail and is hand-operated from the floor. The mold is then transported by the trolley hoist to the well of the copper melting furnace in which it is to be immersed. Chains are hooked into rings on either side of the chuck and the billet is slowly lowered out of the mold into the bath of molten copper which is termed the alloy-bath. When the pre-heated billet is lowered into this bath, a reaction takes place which results in the alloying of the steel at

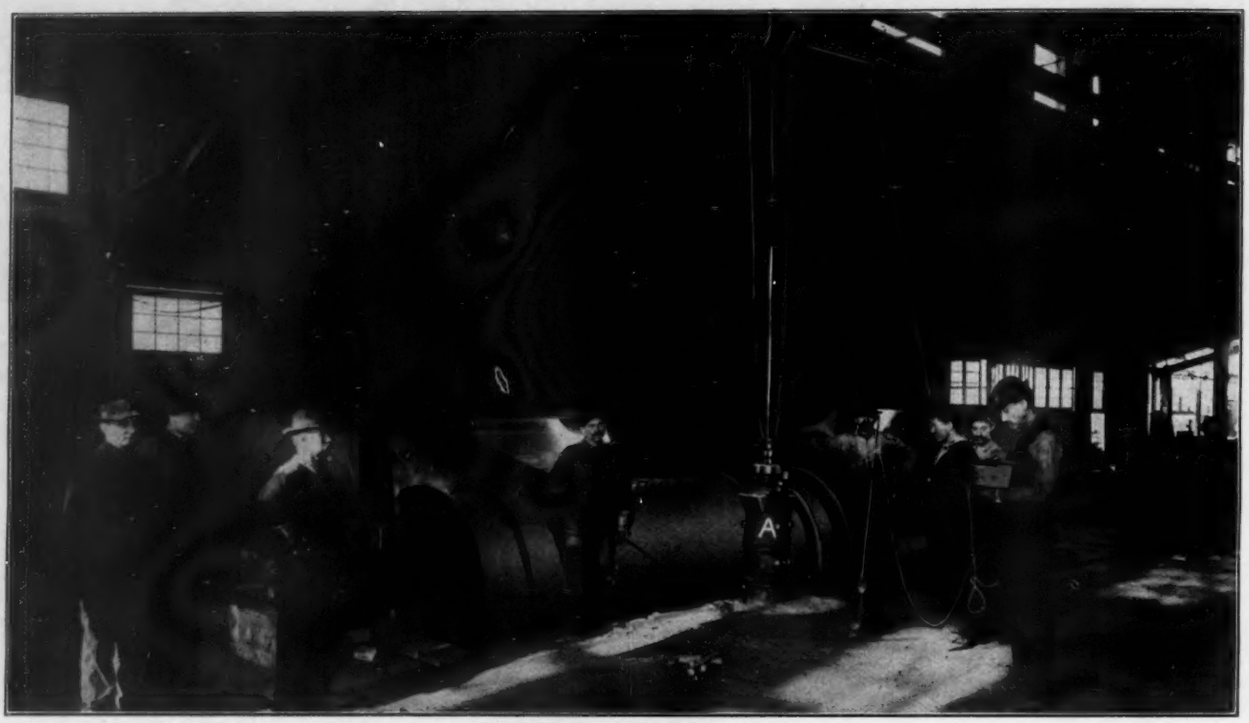


FIG. 2—THE TILTING COPPER MELTING FURNACE, SHOWING THE MOLD *A*, CONTAINING A STEEL BILLET WHICH IS IN POSITION TO BE LOWERED OUT OF THE MOLD INTO THE WELL OF MOLTEN COPPER. IN THE FOREGROUND AN EMPLOYE IS MAKING A READING OF THE TEMPERATURE OF THE MOLTEN COPPER

the surface of the billet with the molten copper.

The copper melting furnace used for the initial coating of copper on the steel was constructed especially for this work and is of the tilting type. It is located in a pit and comprises a main heating chamber and the dipping well. The heating chamber is a steel cylinder about 15 feet long. It is lined with fire brick to a thickness of 9 inches, having a diameter of approximately 4 feet inside the lining. The cylinder operates on wheels or rollers and may be tilted as desired. From two arms extending from one side of the cylinder and perpendicular to its axis, is suspended a weight of approximately 20,000 pounds, which serves as a counterweight to the well on the opposite side of the cylinder. This well is lined with fire brick, having a depth and diameter, inside the lining, of 48 inches and 28 inches, respectively. The well is provided, at the bottom, with a neck which opens directly into the heating chamber. The furnace, while the copper is being melted, is kept in such a position that the axis of the well is

FIG. 3—THE 12-INCH MILL FOR ROLLING COPPER-CLAD STEEL WIRE RODS

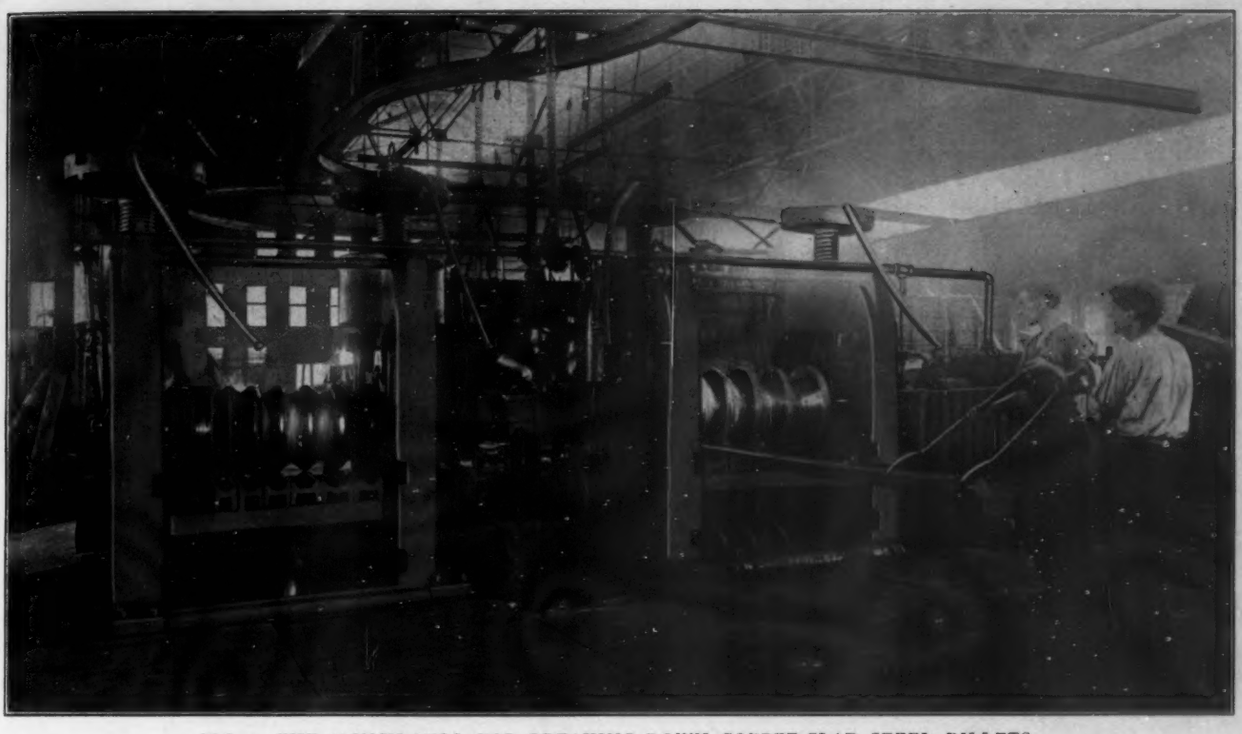


FIG. 4—THE 23-INCH MILL FOR BREAKING DOWN COPPER-CLAD STEEL BILLETS

maintained at an angle of about 45 degrees. When a billet is to be immersed, the cylinder is tilted to lower the well. This operation results in the automatic filling of the well with molten copper which flows from the heating chamber of the furnace. The well is completely filled with copper only when its axis is vertical. Following the withdrawal of the billet from the alloy bath, the furnace is again tilted to its original position, the molten copper in the well thus being returned to the heating chamber. The tilting motion is imparted to the furnace by cables which are attached at one end to the arms from one side of the furnace and supporting the counterweight. The other ends of the cables are wound around a drum which is operated by a six-horsepower motor.

The copper is melted by fuel oil delivered through two pipes running along the two sides of the melting chamber, parallel to its axis. The oil sprays are projected through holes spaced in the pipes at regular intervals. The blast is furnished by a Roots blower which is direct motor-driven. The capacity of the furnace is 23,000 pounds. The installation of a second furnace of this type has been nearly completed.

The hot billet, after immersion in the alloy-bath and with a thin coating of

FIG. 5—THE DUPLEX METAL CO.'S WIRE DRAWING DEPARTMENT

copper clinging to it is again returned to the mold. The chains, which supported the mold during the alloying process, are released and the mold is delivered to the pouring platform. Here the mold is lowered onto a square base which has a raised flange of inverted V-shaped cross-section. The base wedges into the space between the billet and the mold, the outer edge conforming to the inside of the mold and the inside edge to the surface of the billet. This base is designed for the two-fold purpose of securely closing the bottom of the mold and for centering the billet in the mold. Molten copper is then poured into the mold through two gates above the top of the billet. To prevent the unoccupied portion of the mold from being filled entirely with copper, the mold is provided with an opening through which the copper flows when it has reached the required height in the mold. The cast copper unites with the thin layer of copper which has already formed on the heated billet, imparting a coating which adheres firmly to the steel-copper alloyed surface of the billet. The size of the mold varies with the desired thickness of the copper sheath. In the usual copper-clad billets, the area of a cross-section is divided into copper, 40 per cent, and steel, 60 per cent. The copper which is used for casting into the mold is melted in a cylindrical, oil-burning furnace, specially designed for this purpose. Four to six of these furnaces are constantly operated.

Following the casting of the copper sheath onto the billet, the latter is removed from the mold and the fins are removed by pneumatic chisels. The billet, suspended by the rod in one end, is delivered by the hoist to a charging larry which operates on a 15-foot gage track, commanding a battery of six heating furnaces. These furnaces are of the oil-burning type and were designed and built by the Duplex company.

Charging Larry

The charging larry consists of a truck mounted on four wheels, two of them geared to a two-horsepower, reversible motor. The charging mechanism is a steel frame, about 18 inches wide, which operates horizontally in parallel grooves in a rack mounted on and extending the width of the truck platform. At one end of the frame is the charging rod which, in turn, is provided at its end with a flat charging peel. The charging rod is at the level of the heating furnace's bottom.

When a billet is placed on the charging larry, the rod in the end is removed. The billet is then charged into the furnace and is moved to the front of the furnace on rails at the bottom of the chamber. The charging larry is employed also to deliver the heated billets to the rolling mills. The charging rod is actuated by a 10-horsepower, reversing motor, which drives a worm-driven pinion and a gear wheel that engages a rack on the under side of the steel frame to one end of which the charging rod is attached. The furnace chambers are 6 feet wide and 10 feet high. Each of the six furnaces has a capacity for heating 15 billets at one charge.

Rolling Mills

The rolling mill equipment comprises a 23-inch mill, consisting of two stands of rolls which break down the billets into 3 3/16-inch rounds or 4 x 4-inch squares, and a 12-inch rod mill, consisting of 10 stands of rolls. The latter rolls all sizes down to 3/8 inch wire rods. As the Duplex company considers the production of copper-clad steel as its principal line of work, it ships most of its rods to outside wire drawing plants. For taking care of rush and small orders, however, it maintains a completely equipped wire-drawing plant.

The plant is equipped with a number of oil-burning furnaces for reclaiming copper. Into these are charged copper scrap, crop ends of billets and other material, the resulting metal being cast into ingot molds for future use.

Electricity for the operation of the various departments is purchased from a local power company. Scattered through the plant are numerous motors having an aggregate capacity of about 800 horsepower. The steam power plant comprises four 250-horsepower horizontal boilers.

Fuel oil, which is used in large quantities for the numerous oil-burning furnaces at this plant, is stored in two 50,000-gallon capacity steel tanks. These are located below the level of the railroad siding and are filled by gravity through pipes connected with the tank cars. For supplying the furnaces, each tank is equipped with two motor-driven pumps and two separate pipe lines, so that, in case of an obstruction in one of the lines or a breakdown of one of the pumps, the second line may be pressed into service. These tanks are placed in a concrete pit having a flat bottom. By this arrangement, a leak in one of the tanks can be immediately detected and the waste of oil which usually results from a leak in an underground tank is rendered impossible.

The Duplex plant is thoroughly equipped for testing its wire products both physically and for electrical conductivity. The company now is installing a mill for rolling copper-clad sheets and strips for roofing, etc. A narrow gage railway system is being extended to all departments of the plant. Eight wire pickling baths will soon be added and the construction of a second billet pickling bath is under way. Several more heating furnaces also are being built.

The copper-clad steel wire products which this company manufactures are used for telephone lines, signal work, series arc lighting, power distribution, etc. The company has secured an order for over 10,000 miles of wire to be used by the Great Northern railroad in installing a telephone train dispatching system. Twenty spans of this copper-clad wire cable, 4,000 feet in length, are in use across the Niagara river by the Canadian Light & Power Co. This wire is recommended for use as a substitute for copper crane wire, since it is claimmed to have three times the life and twice the strength of copper wire, at the same time costing less. The wire is also extensively used in steel works for guying stacks. The United States Steel Products Co., New York City, is handling the export business of the Duplex Metals Co.

Electrical Generating Engines in Lake Vessels

The Montreal Transportation Co., with offices at Montreal, Que., and Kingston, Ont., has decided upon a somewhat radical change in its lake, canal and river fleet, consisting of the introduction of electrical generating engines into a modernly designed hull. The electric drive has been advocated, in certain quarters, for the Canadian type of freighter and a contract has been placed in England for such a boat, with a Diesel engine and Mayor electric gear, after plans and specifications prepared by an American firm. There will be two high speed, 6-cylinder Diesel engines, each developing about 350 horsepower at 400 revolutions per minute, with their dynamos and exciters, while the propeller shaft will be fitted with a special, squirrel cage induction motor operating at 80 revolutions per minute. One engine can be cut out for adjustment without interfering with the other and with little loss of speed. The saving in weight of engine and fuel over steam of the same power is expected to amount to about 200 tons. A smaller number of men will be required in the engine room, and the space occupied ordinarily by boilers will be available for cargo.

Cleveland-Cliffs System of Safety Inspection[1]

The Prevention of Accidents at Iron Ore Mines and How One Company is Endeavoring to Solve the Problem

By William Conibear

Conservation of human life is the slogan of the industrial world of today. Recognizing that it is of prime importance to prevent injury, not alone from a humanitarian standpoint, but also because it pays as a business proposition, the federal government through the bureau of mines, the great railway systems, nearly every coal mining company, many of the iron mining companies and large and small industries such as factories, foundries, mills, furnaces, etc., are making special efforts to preserve life and abate suffering. Interest in this problem is increasing rapidly and it promises to become a national movement that will provide ultimately the maximum safety and efficiency for all men who are engaged in satisfying the wants of others as a means of providing their own. It needs but a comparison of the loss of life in the industrial world of European countries and the United States to prove that this movement is one that demands our serious consideration and is worthy of our best effort.

High Fatality Rate

That members of the Lake Superior Mining Institute have been cognizant of the high fatality rate in our industry is evident by the number of papers published by the institute, which treat of this subject. The presidential address of 17 years ago is an elaborate review of the causes of fatal accidents and invites the co-operation of state, employer and employe to endeavor to check the unnecessary loss of life.

The economic phase of mining, however, has been paramount and perhaps there has not been the amount of attention devoted to safety that the latter is justly entitled to. As a result the fatality rate has not shown a marked reduction nor does it compare favorably with the fatality rate in other mining districts of the country. The reports of county mine inspectors give detailed descriptions of accidents, but they fail to discuss their causes and means for their prevention. It must be acknowledged that progress has been made in improving conditions in and about the mines, but much remains to be done to reduce the high fatality rate of the past to at least one that, by comparison with the other important mining countries, will not reflect seriously upon our mining methods and conditions.

Cleveland-Cliffs Safety Inspection Department

Because the state failed to meet the demand for more adequate mine inspection, but left it to each mining company to solve the problem, the Cleveland-Cliffs Iron Co. organized what has been designated its safety inspection department. This department has been in existence about 18 months, a period of time inadequate to permit a comparison of results. The statement has been made that one-half of the accidents in our country are preventable, but if their prevention were an easy matter surely the number would have long since been reduced. While the reduction of accidents is not only possible, but imperative as well, it will require much careful study, backed by an intelligent and systematic effort which must have the co-operation of employer and employe to accomplish this result.

A preventable accident is caused either by the carelessness or ignorance of an employe or by the failure of an employer to provide adequate safety devices. As one means of insuring safe working conditions and for the purpose of assisting its employes to exercise safety precautions, the Cleveland-Cliffs Iron Co. has published a book of rules and regulations. This book has been issued in two forms, one for superintendents and foremen and one for all other employes. The first is printed in English and is in two parts; one includes a foreword from the president of the company and the rules and regulations for superintendents and foremen, and the other part includes the general rules and regulations. The second form is printed in English, Finnish and Italian, which are the several languages spoken by a large majority of the company's employes, and includes a foreword and general rules and regulations. Every employe receives a book and his signature for the same and agreement to study and live up to it are filed at the central office of the company. Within a reasonable time he must satisfy his foreman or boss that he is familiar with the rules of the company. The first violation may be sufficient cause for a suspension of six days or longer and a second is usually followed by dismissal from the company's service.

It has always been a rule of the company to post in conspicuous places copies of the bell signals, the special rules which govern the use of explosives, and the duties of hoisting engineers and motormen. It is not necessary to add that this practice is still in force.

The Safety Inspector

The safety department is in charge of a safety inspector whose duty it is to inspect all places where men are working or through which they are obliged to travel. His reports are submitted to the company's agent, to whom he is responsible for a conscientious performance of his duties. The inspector is expected to report all dangerous conditions that come under his observation and which may not be brought out by the questions embodied in the formal blank on which he turns in his reports. A proposed inspection of a mine is not announced and, therefore, no opportunity is given the men in charge to make changes that may be necessary to meet the requirements of the rules. As failure on the part of the inspector to report impartially all violations of rules or dangerous conditions would frustrate the very object of his official existence, this method of inspection is one that stimulates a foreman to keep the mine in such a condition at all times as to comply with the safety rules and keeps him alert for unsafe or unguarded places. The inspection form and the examinations by the foremen's and workmen's committees give the inspector no opportunity to offer a plausible excuse if he has been derelict in the discharge of his duties.

Safety inspections are made periodically by a committee of mine foremen, consisting of three members, who are selected from different mines

[1]A paper read at the Houghton meeting of the Lake Superior Mining Institute.

of the company. The committee is instructed directly by the agent and each member is furnished a copy of the questions which form the inspection. The safety inspector accompanies the committee on its tour of inspection, in the capacity of secretary. He has no voice in the decisions, which the committee may reach, but has to record them and incorporate them in a report, which is read very carefully by each member of the committee before he attaches his signature thereto and permits it to be transmitted to the agent. The committee makes one inspection of all mines and is then discharged.

An inspection of this kind may be the means of suggesting points of possible danger that might otherwise pass unobserved by a safety inspector, and it assures to the company the experience and judgment of men who should be best qualified to recognize dangerous conditions and unguarded appliances. During the brief life of the safety department of the Cleveland-Cliffs Iron Co., the members of the foremen's committee, without exception, have esteemed it a special favor to make a safety inspection and have gladly accepted the opportunity of being a factor in providing greater safety for their fellow workmen as well as for themselves.

Workmen's Safety Committee

A method of accident prevention is not complete unless it aims to win the confidence and co-operation of the workmen, and with this object in view the company has its workmen's safety committees. These committees work in conjunction with the safety inspector and the procedure of preparing a report is similar to that of a foremen's committee with one essential difference and that is that each mine is inspected by a committee of its own workmen, whereas one foremen's committee makes an inspection of all mines. Workmen of different nationalities are chosen, and each successive inspection means three additional employes at each mine, who have given the working conditions of that mine their approval or else have offered recommendations to lessen danger. There are many foreigners employed in the mining industry, who speak little or no English, and it is interesting to observe the curiosity which they frequently exhibit when a fellow countryman happens to be a member of the safety committee. When the mission of the committee has been duly explained then the workmen must satisfy the members of the committee that they are complying with the rules and regulations by producing cap crimpers and skewers, by showing that detonators are stored apart from dynamite, etc. Thus the workmen are brought to understand the safety precautions which the company is exercising and habits of indifference and recklessness are supplanted by habits of interest and caution.

Central Safety Committee

The central safety committee is composed of the company's mine superintendents of Marquette county, the head mining captain, the master mechanic, the assistant auditor, the secretary of the pension department and the safety inspector, with the agent as a member ex-officio. This committee meets monthly, and acts as a legislative body on all safety recommendations which may have been offered by the foremen's and workmen's committees and the safety inspector and to the application of which objection has been raised. A majority vote of the committee is recorded, and as such is communicated to the agent as the recommendation of the central safety committee. As soon as it is approved by the agent it must be enforced. If a recommendation is considered of sufficient importance to justify a special rule that shall have general application at all mines it is accepted as such and is accordingly classified under the heading New Rules. In short, all matters of safety, the expediency of which give rise to difference of opinions, are referred to the central safety committee for decision. The committee receives reports of all accidents, whether fatal, serious or slight, which have occurred during the previous month, and classifies them by causes, using for its classification a key which was obtained from R. J. Young, manager, department of safety and relief of the Illinois Steel Co. Preventable accidents are carefully considered and recommendations are suggested for preventing their recurrence.

First Aid to the Injured

It is hardly necessary to call attention to the value of first aid to the injured, but its importance cannot be overestimated. Even if the day of preventable accidents were a thing of the past, the non-preventable accidents are inevitable. Especially is this true of a trade as hazardous as iron ore mining, with its deep mines and constantly increasing mechanical appliances. In certain mines in Pennsylvania first aid instruction and that alone has resulted in reducing sick and death benefits 50 per cent. A simple fracture may become a compound fracture if the patient is not properly handled, and hence an accident which requires a few weeks of comparatively painless healing becomes one that lengthens into a much longer time of confinement, with considerable danger of death if wound infection develops. This is an illustration of but one kind of injury which frequently occurs in mining and is cited merely to emphasize the value of having workmen around the mines who have a practical knowledge of the essentials of first aid to the injured. The Cleveland-Cliffs Iron Co.'s first aid organization and training was started under the instructions of an employe of the bureau of mines, whose services were obtained for a month. During this time a number of employes became competent to continue the work. A corps of five members, consisting of both surface and underground employes, is under training at each mine. Each member is furnished with a copy of the American Red Cross Textbook on First Aid. A drill is held regularly each month and individual and team work are the features. Demonstrations in which all teams participate are held as soon as the teams under training become proficient. When a member of a corps becomes competent to administer first aid treatment, a new team is selected and each member of the retiring team is given a certificate of competence to administer first aid to the injured, with the stipulation that he must undergo additional training every six months.

Mine Rescue Stations

The Cleveland-Cliffs Iron Co. has established three mine rescue stations which are equipped with oxygen helmets, electric portable lamps, pulmotors and quantities of supplies. A man is delegated to look after each station and train men at all mines which are assigned to his station. Employes who are familiar with the working places of the mine in which they work, such as foremen, timbermen, trackmen, etc., are chosen as members of the fire corps. The training consists in explaining the apparatus to the men, putting it on them, sending them in stopes or drifts after a blast, building brattices, carrying men, and such other work as might be expected in an actual case of fire. Each corps is drilled at least once a month and a record is forwarded to the central office of the company. A monthly report of the condition of the

equipment at each station is made out by the foreman in charge and is also sent to the central office.

The pulmotor, a unique mechanical contrivance, is an automatic resuscitating apparatus for restoring a person overcome by gas. It has been used very successfully in the large cities and is an essential part of a mine rescue station. In addition to a pulmotor at each of its rescue stations, the company has one at those mines which are located several miles distant from a station. The probability of underground employes being overcome by gas resulting from the use of dynamite is more constant than the probability of a mine fire. Accidents of this nature occur very frequently and a successful application of this apparatus upon a patient is more efficacious when there is little delay in administering the treatment.

Automatic Thread Rolling Machine

A new thread-rolling machine, shown in the accompanying illustration, has recently been designed and built by the E. W. Bliss Co., Brooklyn, N. Y. The machine was made more especially for rolling threads on round shells having flanges on steps, although straight, cylindrical shells may be threaded. The illustration shows the machine arranged with a feeding chute for threading harness oil tops. With this arrangement it will roll a thread on the neck of a shell, when the diameter of the neck is only ½ inch and when the diameter of the flange is as large as 3 inches. If only cylindrical shells are to be threaded, one feeding chute with two sets of adjustable liners is sufficient for the entire range of work for which the machine is adapted, but for other than cylindrical shells a separate feeding chute is required for each shell of different shape.

It is stated that the machine will thread 30,000 shells in 10 hours and that it can take work from ½ to 3 inches in diameter and up to 1¾ inches high. The operation of the machine is as follows: The shells are placed in the chute which is made in two sections and from which they are released by an automatic trip. The lower half of the chute turns on a swivel and carries the shell in line with the lower chuck, onto which the shell is forced by an automatic pusher. The feeding chute then recedes, leaving the shell in the retainer, and the upper chuck moves in and rolls the thread, after which the shell is automatically ejected.

Wire Ropes for Lifting Appliances[1]

By Daniel Adamson

The two most important conditions appertaining to the manufacture and use of steel wire ropes that affect their durability are:

Quality of material and size of wire.

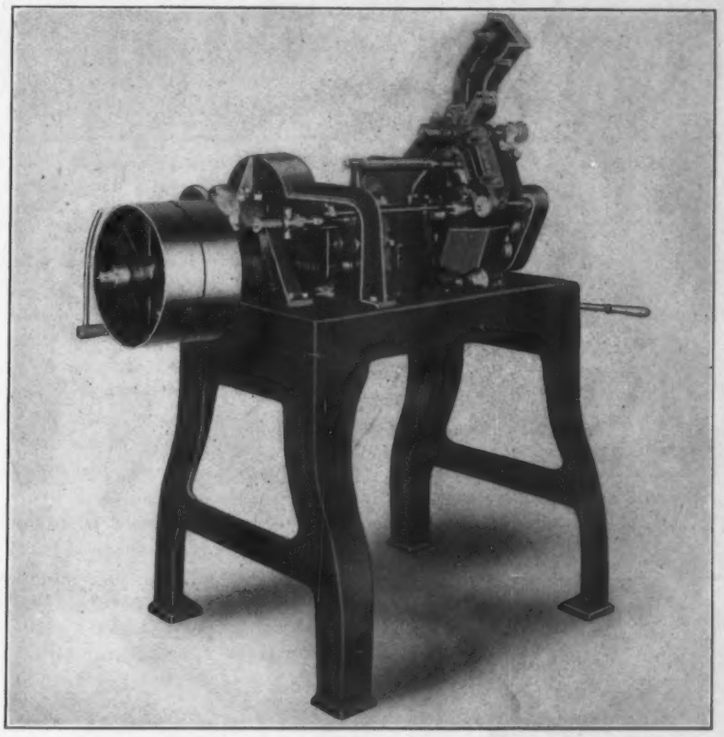
Diameter of pulleys and arrangement of ropes.

The wire used for lifting ropes is of crucible steel having a tensile strength varying from 80 to 130 tons per square inch. Although ropes made from material having a high tensile strength are of smaller diameter, for a given load and a given factor of safety, yet this is not a great advantage to the crane designer because the stiffer character of the wires makes larger drums desirable, if the durability of the rope is to be considered, notwithstanding that some rope makers claim as an advantage for the stronger material that it enables smaller pulleys to be used with a consequent lower cost of the working parts of the crane.

The ratio of the diameter of the individual wires to the diameter of the completed rope is an important factor. If the wires are too large they are stressed considerably when passing over the pulleys, and accordingly, the material is quickly fatigued and the wires break. Smaller wires, on the other hand, are more quickly worn through by rubbing against the pulleys and other wires in the body of the rope. The stress in a wire due to bending around a pulley is directly proportional to the modulus of elasticity and to the diameter of the wire, and inversely proportional to the radius of the pulley; therefore, the radius of the pulley should be increased with an increase in the modulus of elasticity, if the same number of bends is to be endured by a stronger wire of the same diameter. Unfortunately, a theoretical calculation of the stresses induced in the wires of a rope by being bent over a pulley does not alone afford a reliable guide to the length of life to be expected from the rope, for consideration must also be given to the mutual wear that takes place among the wires.

It is quite usual for purchasers to specify in their inquiries that the diameters of the pulleys and drums must bear a certain relation to the diameter of the rope, but this stipulation is not sufficient in itself without some consideration being also given to the arrangement of the rope and pulleys. The lay of the strands and the lubrication of the rope when in use have each considerable effect upon durability.

[1]Abstract of a paper read at the Belfast meeting of the Institution of Mechanical Engineers, July, 1912.



BLISS AUTOMATIC THREAD ROLLING MACHINE

German Mill for Rolling Axles

By C. Werckmeister.

Steel axles, to a very large extent, are made by a forging process instead of rolling, although many methods have been devised for the production of axles on rolling mills. Many of the mills designed for rolling axles consist of a stand of three rolls, arranged as shown in Fig. 1. Only the lower rolls are connected with pinions and the top roll, which exerts the reducing pressure, is operated as an idler. By this arrangement the resistance of the top roll serves to retard the rotation of the axle which is actuated by the friction of the two bottom rolls. As a result, the steel in the center of the axle segregates and large hollow spaces are produced. The action of the bottom rolls, as well as the top roll is shown diagrammatically in Fig. 2. An attempt was made to overcome this difficulty by driving the three rolls through four pinions, as indicated in Fig. 3. The three roll pinions are driven from a center pinion direct-connected with the engine or motor. However, this arrangement did not prove satisfactory, as the pinions were too small for the work they were intended to accomplish. For rolls 21 inches in diameter pinions were employed having a pitch diameter of about 12 inches.

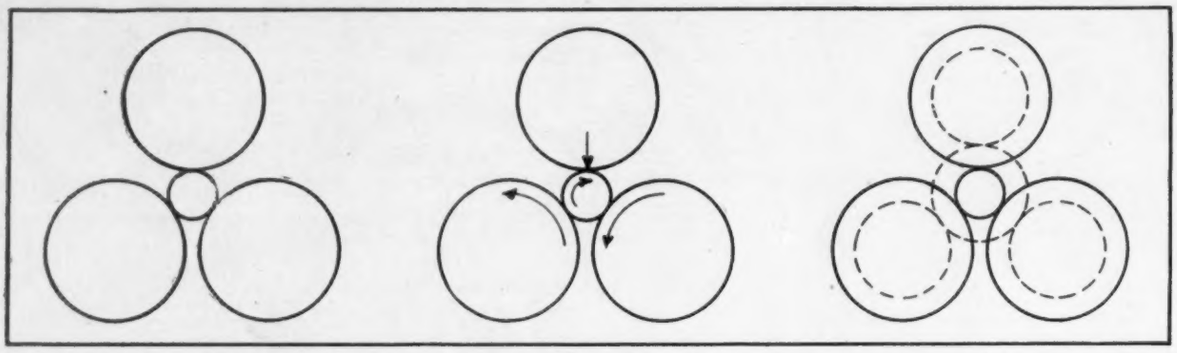


FIG. 1—DIAGRAMMATIC ARRANGEMENT OF ROLLS FOR AXLE MILL, TOP ROLL BEING USED AS AN IDLER

FIG. 2 — DIAGRAMMATIC VIEW OF ROLLS, FIG. 1, SHOWING THE ACTION ON THE AXLE

FIG. 3—ARRANGEMENT OF AXLE MILL ROLLS, TOP ROLL BEING DRIVEN BY A PINION

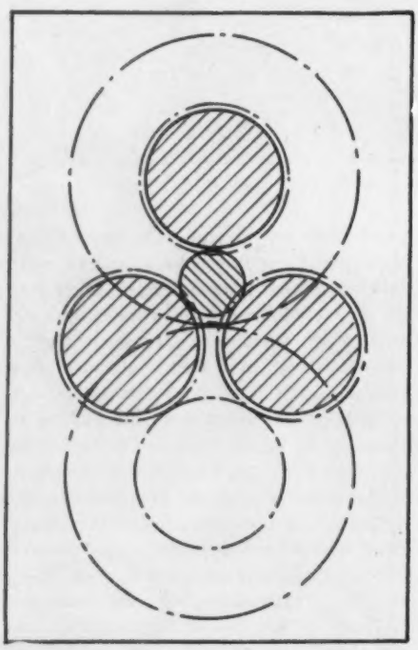


FIG. 4—ARRANGEMENT OF PINION DRIVEN ROLLS

A new type of axle rolling mill has been designed by the writer, which is intended to obviate all of the difficulties previously encountered. The arrangement of the rolls is clearly shown in Fig. 4. The top roll is direct-driven by a motor while the bottom rolls are independently driven from the shaft for the top roll. By this arrangement the vertical pressure of the top roll is uniformly distributed over the axle while it is being rolled by the two bottom rolls. Axles made in this way are sound and the fracture does not disclose the segregation of the steel which resulted from previous practice. The rolls which are shown diagrammatically in Fig. 4, are arranged in one stand. Two stands of rolls, however, are required, the first for producing the tapered center section of the axle and the second for rolling the bearings. Side and end elevations of one of these mills, together with a sectional view showing the arrangement of the stands of rolls in relation to the continuous heating furnace are shown in Fig. 5.

A New Rotary Planing Machine

The accompanying illustrations show a new rotary planing machine that the Newton Machine Tool Works, Inc., of Philadelphia, has designed and built. Fig. 1 shows a standard machine on a round base and Fig. 2 shows the latest design of counter-balanced drive for the various sizes from 26 to 120 inches over the cutting tools. It is stated that rotary planing machines must have rigidity and flexibility in addition to being adaptable for operation on all columns from the smallest to the largest, within the machine range; also that the drive to the cutter head must be such that the head is prevented from jumping. If the latter is not the case a severe jolt is transmitted through the whole machine whenever a tool comes in contact with or leaves any of the intermittent surfaces on the structural shapes or columns.

Experiments have indicated, it is said, that much power is lost through the use of long screws and driving shafts and that chatter originates in these parts. It was, therefore, decided to eliminate such parts and to drive direct from the saddle, making a compact design with centralized control, with all operating parts mounted upon and traveling with the saddle. Referring to Fig. 2, the motor is located on top of the saddle pad, *A*, and motion is transmitted from a motor pinion to the gear *B*, attached to a driving worm shaft and thence through a driving sleeve worm wheel to the cutter head driving pinion *C*, the latter having teeth cut from the solid driving shaft. In this manner the drive is accomplished by three spur gears and one worm and worm wheel, and all parts operating under heavy stresses have their supports in a common casting.

The driving worm is of hardened steel fitted with roller thrust bearings and the sleeve worm wheel has a bronze ring with steep-lead teeth, all being entirely encased for lubrication. The cutter head is made of cast steel to withstand heavy strains and to insure preservation of the tool slots, also to permit of machining the internal driving gear from the solid head. The tool-clamping screws, *E*, Fig. 1, are of the submerged type,

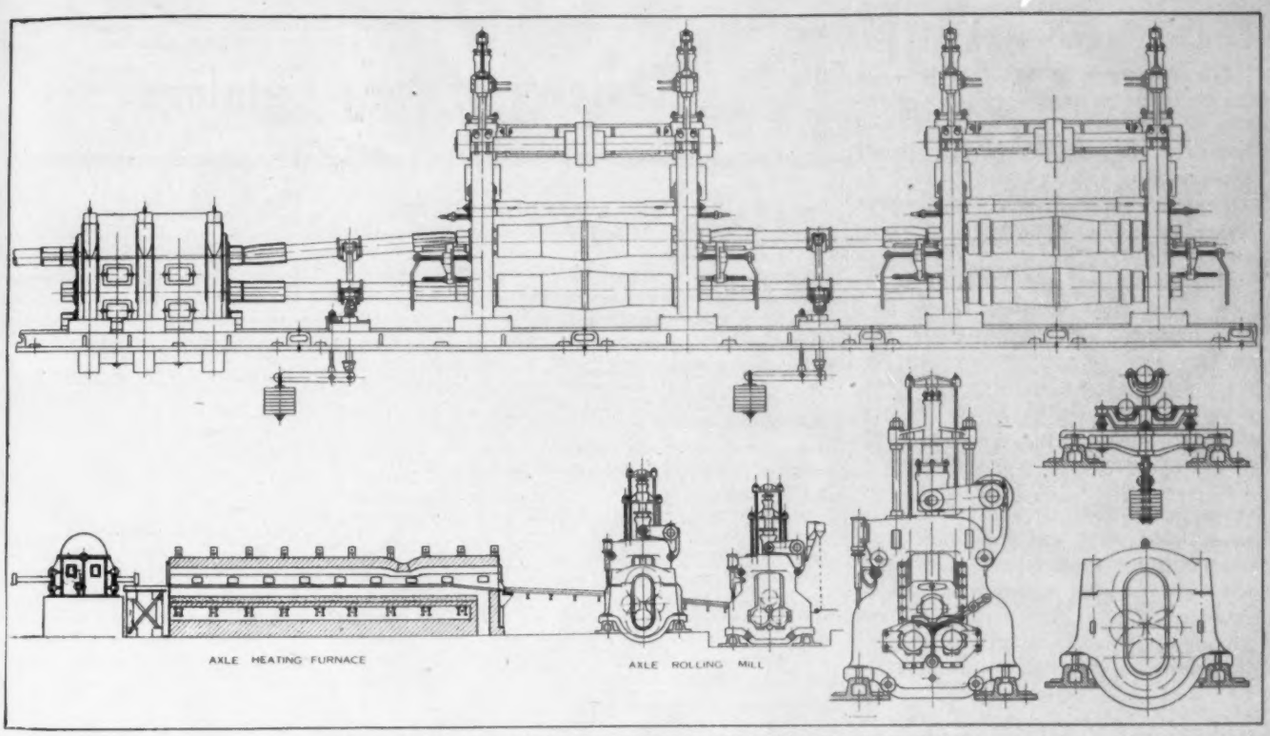


FIG. 5—SIDE AND END ELEVATIONS OF GERMAN AXLE MILL

to conform to the accident prevention laws. In addition to the slots for roughing tools, two slots at right angles are provided for finishing tools. The cutter head has an hydraulic press fitted to the spindle, the latter revolving in a capped bearing, *H*, Fig. 2. The diameter of the spindle is not excessively large or subject to frictional losses, the spindle being considered only as a centering point. Fig. 2 shows the position of the internal driving pinion *C*, the spindle bearing, *H*, and the pinion which engages the cutter-head gear and which transmits motion for the saddle feed and reversing fast power traverse, all of which are mounted in a common casting.

The feed transmitting pinion is located in a manner to permit placing the load of the feed and fast power traverse in such a position as to prevent the jump of the head when the tools are leaving the cutter. From the feed-transmitting pinion, motion is transmitted through the tumble gear, *J*, Fig. 2, which controls the direction of traverse, to the spiral gear shaft, *K*, controlling the fast traverse and carrying also the keyed gears for the feed, and to the pull-pin gears, *L*. The latter are mounted on the shaft with the worm that engages the worm wheel, *M*. In this way all parts having opposed stresses are mounted in a common casting. All operating gears are of steel or bronze.

To adjust tools for depth of cut, the spindle saddle, *N*, is adjusted from the screw, *O*, the direction of traverse being controlled by the lever *P*. The fast traverse and feed are engaged by the handwheel, *R*, so arranged that opposed movements cannot be engaged at the same time. These planers are furnished portable; with a stationary work table, *S*, or mounted on a circular base, and with power or hand circular adjustment, as shown in Fig. 1. It is stated that actual comparisons show that this machine has 30 per cent greater width and length of saddle on the base and 30 per cent greater length of spindle in the bearings, to control the alignment of the head, and that no extra stiffeners are required back of the head. The stationary machines are furnished belt or motor driven, but the portable and circular base machines are motor-driven only.

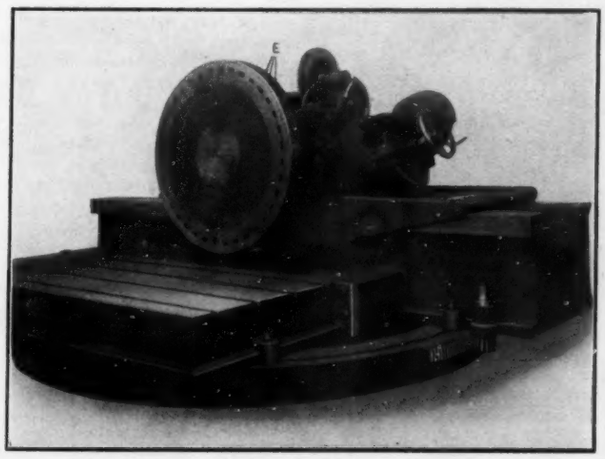


FIG. 1—STANDARD ROTARY PLANING MACHINE ON A ROUND BASE

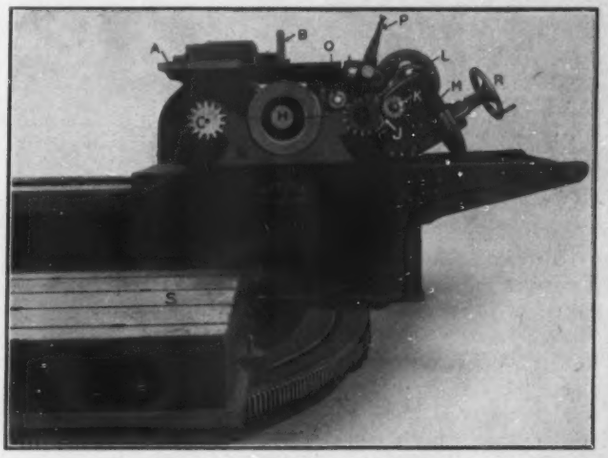


FIG. 2—ROTARY PLANING MACHINE WITH COUNTERBALANCED DRIVE

Book Reviews

The Assistant Buyer; published by the Sullivan System, Inc., New York City, and furnished by THE IRON TRADE REVIEW, Cleveland, for $7.50, to which expressage is added.

The 1910 edition of The Assistant Buyer, in addition to being a revision of the 1910 directory, contains a large amount of additional information. This work contains the following divisions: Tools, including mechanics' tools for all trades; machinery for metal and woodworking supplies, including steam, plumbing, mill, mine, railroad, ship, machine shop, etc., and heavy and shelf hardware. The new edition of the T-A-B universal loose-leaf catalog will be issued shortly and will contain in condensed form, illustrations and standard list prices of a large number of standard lines of hardware, tools and supplies. The Assistant Buyer and the universal catalog both will be furnished at a price of $10, f. o. b. New York, while either book will be furnished separately for $7.50.

* * *

Hendricks' Commercial Register; 1,574 pages; published by the S. E. Hendricks Co., 74 Lafayette street, New York, and furnished by THE IRON TRADE REVIEW for $10, postpaid.

The twenty-first annual revised edition of Hendricks' Commercial Register of the United States for buyers and sellers, recently issued, contains a total of more than 50,000 classifications, each representing the manufacturers or dealers of some machine tool, specialty or material required in the architectural, engineering, mechanical, electrical, railroad, mining and kindred industries. This directory contains 1,574 pages, an increase of 155 pages over the twentieth edition. While the twentieth edition required 108 pages to index its contents, the twenty-first edition requires 122 pages. The classifications are so made that the book can be used either for purchasing or mailing purposes. One of the features of the directory is the list of trade names of all articles classified as far as these could be obtained.

Thirteen and one-half miles of four-track subway are now under construction in Greater New York, according to a report submitted by Robert Ridgway, acting chief engineer of the New York public service commission. The outlay involved in the contracts is about $62,000,000 and about 5,000 men are employed on the work.

Reviews of New Catalogs

TURBINES.—A folder issued by the Kerr Turbine Co., Wellsville, N. Y., is devoted to the line of turbines built by this concern. Illustrations of installations are included, interesting steam consumption curves are given and size comparisons are made.

MACHINISTS' SUPPLIES.—In an exceedingly comprehensive, 170-page catalog, the entire line of machinists' supplies manufactured by the Whitman & Barnes Mfg. Co., Akron, O., is illustrated and described. In addition to such data as dimensions, grade of steel, etc., prices of all the products are included.

BLOWERS.—A bulletin recently issued by McEwen Bros., Wellsville, N. Y., describes and illustrates various types of blowers manufactured by that firm and intended for steam turbine drive. Particular attention is given to the propeller blowers and the pamphlet contains a number of charts and tables bearing on that type and the forced-draft machine that the company also makes.

POWER GENERATORS.—Direct current lighting and power generators, direct-connected or engine type, are described in a bulletin issued by the Crocker-Wheeler Co., Ampere, N. J. These are built in sizes of 200 to 1,500 kilowatts. The features to which attention is especially directed are simplicity, compactness, rigidity and durability of construction.

POWER TRANSFORMERS.—In a recently issued bulletin, the Crocker-Wheeler Co., Ampere, N. J., describes its line of oil-insulated, self-cooled and water-cooled power transformers which are made in sizes of from 50 to 5,000 kilo-volt-amperes. These transformers are of the core and butt-joint type and are especially designed to bear up under heavy overloads and shocks due to sudden changes of voltage and current.

LIFTING WATER BY COMPRESSED AIR.—The advances made in the solution of the problem of lifting water by compressed air are described in a 70-page booklet issued recently by the Ingersoll-Rand Co., 11 Broadway, New York City. A large number of illustrations are shown, together with tables giving the cost of operating plants that have been erected in various parts of the country. The system has been found useful in many lines of work where an abundant supply of good water is desired.

AUTOMATIC STOKERS. — A bulletin published by the American Stoker Co., 11 Broadway, New York City, is devoted principally to the company's Class E stoker. The pamphlet contains 31 pages and is well-illustrated, besides including numerous charts and tables of data. This stoker is of the underfeed type, the fuel being fed to the underside of the fire in such a way as to effect the destructive distillation of the coal and the driving off of its volatile gases. It is claimed that this machine is a feeder and a thorough coker, that it distributes the fuel thoroughly and is self-cleaning.

AUTOMATIC GEAR HOBBING MACHINES.—High duty, automatic, gear hobbing machines for cutting spur, helical and worm gears, are described in the 1912 hobbing machine catalog issued by Gould & Eberhardt, Newark, N. J. These machines have been designed so as to have the highest efficiency when using high-speed steel hobs. The operating levers are conveniently located and all gears are provided with suitable guards. The hobs are proportioned to generate involute teeth without interference and each one is rigidly inspected and confined to very close limits of error. The catalog contains illustrations of the various types of machines described.

FEED WATER HEATERS. — The Exeter Machine Works, Pittston, Pa., has recently issued a 15-page catalog, containing illustrations and descriptions of an open feed water heater and purifier. It is said that this machine combines in one apparatus, the following devices: Feed-water heater, purifier, oil separator, drip receiver and expansion tanks. The heater is constructed almost entirely of cast iron. A system of upward filtration is used in the purifier, for which numerous advantages are claimed. A specially designed float, operating in a chamber outside the heater, responds quickly to the demands of the heater and automatically operates the water supply valve.

VANADIUM STEEL. — In a well-illustrated, 24-page booklet, the United Steel Co., Canton, O., gives some interesting information about the results obtained from tests of the vanadium steel that the company manufactures. These tests were made on vanadium steel crank-shafts, axles, drive shafts, gears, etc. A number of tables give figures showing yield point, ultimate stress, ratio, elongation, etc., for vanadium and other steels, and numerous illustrations show some of the products that have been subjected to cold bending and twisting. The company carries a stock of chrome vanadium steel bars in all types and is prepared to furnish turned, straightened and polished chrome vanadium steel shafting, in addition to vanadium steel ingots, blooms, slabs, billets, plates, sheets, merchant bar sizes and some special shapes or sections.

AUTOMATIC MULTIPLE SPINDLE CHUCKING MACHINES.—A well-arranged and illustrated 38-page catalog has recently been issued by the New Britain Machine Co., New Britain, Conn. This company has acquired the business of Geo. C. Prentice & Co., Inc., formerly of New Haven, Conn. The chucking machines are built in two distinct types, single head and double head. The double-head type handles pieces requiring operations on both ends, accomplishing the result in less time than would be required on a single-head machine. On the double-head type the spindles range in number from three to eight. These carry and revolve the tools, while several pieces of work are held stationary in the multiple-chuck turret. With the single-head machine, the turret advances and feeds the work against the revolving tools, but in the double-head type the revolving tools advance from both sides and perform their operations on each end of the work. Four sizes of single-head machines are described, with tables showing the range of work in each case and a list of specifications. Three sizes of double-head machines are shown, accompanied by similar data as to working range, specifications, etc. The pamphlet concludes with illustrations of the work that these machines will perform, including automobile, speedometer and carburetor parts, plumber's brass goods, etc.

The Sixth International Testing Congress

Report of the Proceedings of This Important Meeting Which Was Attended by the World's Foremost Scientists and Testing Engineers

Inability to unify the testing methods of the world's leading manufacturing nations prevented the adoption of international specifications for iron and steel products at the sixth testing congress. The sentiment was expressed that universal standards, before they can be adopted, must represent an advance over the existing specification of the different countries interested. Germany, France and the United States are more nearly in agreement than is England with these countries, although there are many differences of minor importance in most instances, which again have postponed the adoption of unified, international testing methods. In England, pig iron continues to be graded by fracture, whereas the other leading iron producing nations long since have replaced this uncertain practice by a reliance upon chemical analysis. The adoption of an international arbitration test bar for cast iron is one of the early probabilities, the length of the bar in use today in the different interested countries being the chief point of difference. That the standardization of testing machines, to permit obtaining favorable test results, is essential, was indicated by the widely divergent views expressed of the utility of the testing equipment in use in laboratories all over the world.

That the interests of consumers, and ultimately that of the public, might be better safeguarded by the use of construction materials of known standards, was the underlying purpose which prompted the gathering of the world's most renowned scientists and engineers at the sixth triennial congress of the International Association for Testing Materials held at the Engineering Societies' building, New York, Sept. 2-7. The widespread interest in this work, on an organized and highly specialized basis, was reflected by the presence of 149 delegates from 19 foreign countries, and including the testing engineers from all sections of the United States who represented widely diversified industries, the attendance for the week aggregated nearly 800. Papers and reports submitted for consideration totaled 153 and while the program seemed of interminable length, the careful classification of subjects and their assignment to three sections which held simultaneous sessions, facilitated proceedings and enabled the disposition of the tremendous volume of work outlined for the congress. The steel rail problem, as usual, excited considerable interest and the subject, as summed up by Capt. R. W. Hunt, points to the necessity of obtaining sound ingots to secure sound rails. Piping, segregation and blow-holes, he stated, are three defects of steel which must be cured, two of these being physical and one chemical.

DR. HENRY M. HOWE, ACTING-PRESIDENT OF THE INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS, AT THE RIGHT; JOHN A. HENRY, OF THE CARNEGIE STEEL CO., AT THE LEFT

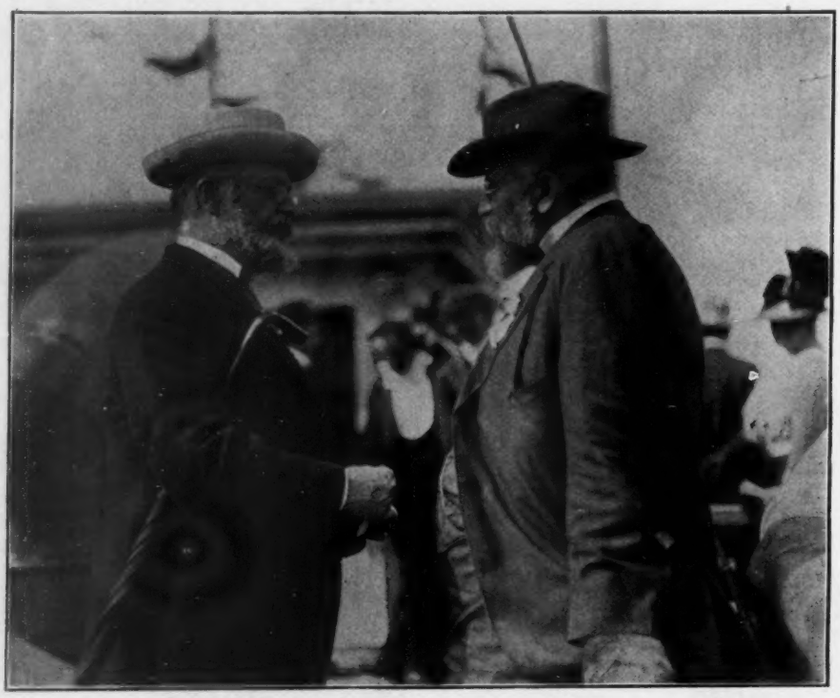
American steel rail manufacturing practice differs widely from that pursued in Germany and England, where smaller ingots are used for rails, which, it is claimed, insures a better product, although the obtainable tonnage is reduced. By the use of smaller ingots, it is claimed that such defects as segregation, blow-holes, piping, etc., to a large extent, are eliminated. The unification of rail specifications by the leading manufacturing countries of the world is a step for future consideration, as it was not even seriously considered by the delegates at the sixth congress.

Testing machines and equipment in use in the leading laboratories all over the world were given careful consideration and if the utility of these is measured by the reports of some of the foreign delegates, it would seem that few testing devices in use today have any merit. This wide divergence of opinion emphasizes the necessity of standardizing testing equipment. Then only will it be possible to obtain comparable results, whereas today, the results obtained on one machine cannot possibly be compared with those of a machine intended to test the same physical property, but of an entirely different type. The adoption of international specifications and methods for testing cast iron, were not even seriously considered and it is doubtful whether an agreement can be obtained on the many points in question, to permit of an agreement at the next triennial congress. While the testing engineers in attendance voiced a sentiment favorable to the unification of iron and steel specifications, nevertheless many differences in practice and methods of testing exist which will defer the adoption of international standards for a considerable period.

Steel rail failures, their causes and the methods proposed for the improvement of their physical and chemical properties, were discussed at length by both American and foreign engineers

The necessity of a sound ingot to produce a sound rail was emphasized and it was pointed out that tests of three, or even more trial ingots of a heat were not sufficient to indicate the quality of the steel and that the only conclusive results could be obtained by subjecting every ingot to tests for the detection of impurities and defects.

"Getting sound ingots commercially is the solution of the whole problem," said Capt. R. W. Hunt, of Chicago, in answering the discussion upon his paper, "Insuring Soundness in Steel Rails". Capt. Hunt in his paper sought to show that no matter what the composition of the steel might be chemically, each ingot, from which rails are rolled, must be considered individually. "Upon the soundness of the ingot must depend the soundness of the rail," added the speaker. "Taking three out of 30 ingots for



BRIG. GEN. WILLIAM H. BIXBY, CHIEF OF ENGINEERS OF THE UNITED STATES ARMY, AT THE LEFT, GREETS AN OLD FRIEND

testing, is not conclusive; in some way each ingot should be tested." Methods for making these tests without greatly increasing the cost were outlined. Capt. Hunt pointed out that the larger the size of the ingot, the greater is the increase in segregation. Piping exists in all ingots as they are now cast, he said. The speaker advocated that at least 33-1/3 per cent of the top of the ingot should be discarded in rail practice as experience with the development and improvement of the quality of higher grade steels had shown that this is absolutely necessary to avoid the common defects. This increased discard, he stated, need not be scrapped, but could be utilized for the manufacture of splice bars and other rail fastenings.

Capt. Hunt's suggestion that the discard of the ingot should be devoted to the manufacture of splice bars was criticized by Henry D. Hibbard, consulting engineer, Plainfield, N. J. He contended that the splice bar was an integral part of the track construction and that it was just as essential to have sound steel in these bars as in the rails themselves. This criticism was answered by Capt. Hunt, who stated that the upper part of the ingot, if utilized for splice bars, is reduced to very small sections and passes through a series of manufacturing operations which would readily admit of critically examining the steel for defects. He added that he had never known of a wreck caused by broken splice bars.

A written discussion of Capt. Hunt's paper, which was submitted by Mr. Hibbard, is as follows:

There is no doubt, as Capt. Hunt says, and as others have said before, that to make a sound steel rail, or for that matter, any other kind of sound steel bar, demands that it be made from a sound ingot. Unsoundness in the ingot is apt to be followed by unsoundness in the product. Let us first clearly understand that the three defects known as pipe, blow-hole and segregation, which cause most of the unsoundness in rail ingots, are due to different causes and are to be cured, if at all, each by its own appropriate means. The pipe is a physical defect due to the physical cause of decrease of volume of the metal when it loses heat. Sound steel always tends to pipe.

The blow-hole is a physical defect due to the chemical cause of dissolved gas in the metal which is allowed to escape from solution and lodge in the metal during the freezing.

Segregation is a chemical defect due to the physical cause of concentration of non-metallic ingredients in the metal, last to solidify in accordance with the action of many other freezing mixtures or solutions.

Now it seems reasonable, perhaps, that pipe and segregation, being due to physical causes, are to be cured by physical means, while the blow-hole, due to a chemical cause, is to be cured by chemical means or treatment. The cure of the blow-hole is to have in the metal, just before the final additions, a reasonable minimum of dissolved gases and of oxide of iron, and then to add at the end, enough solvent silicon or its equivalent, to keep in solution the gases still in the steel until it is frozen. That is, it must be well-made or melted. The cure of the pipe is compression of the ingot during solidification to keep pace with the relatively greater loss of volume of the interior as compared to the exterior parts of the ingot.

The cure of segregation may be effected in part by increasing the rate of compression just before final solidification, so that some of the still-fluid metal will be expelled at the top from the body of the ingot. The ingot should be cast in a collapsible mold, large end up. The press should be horizontal acting, and after the ingot mold is placed therein, it should compress the ingot continuously, though slowly, until freezing is complete. A number of plans proposed for preventing or obliterating pipe provide for a single act, either compression in a press or rolls, or the introduction of a piece of metal to fill the pipe, but a little reflection will show that there is no one instant at which such single act can be effective to the desired end. The cure must be continuous.

How to Make Sound Ingots.

Compression has some effect in increasing the size and number of blow-holes should any tend to form, but cannot be relied upon alone to prevent them.

To make a sound ingot requires the following steps:

1.—The metal, before the final additions made for rectifying the composition, as well as to improve the quality must have a reasonable minimum of gases, and of oxide of iron as well as of the usual impurities.

2.—The final additions must be such as will give solid piping steel, practically free from blow-holes.

3.—The ingot should be cast large end up to localize the pipe at the top end. A collapsible mold should be used.

4.—The mold containing the ingot should be placed in a slow-acting, horizontal press, about 15 minutes after teeming, and the upper third should be slowly pressed by lateral compression until the whole is solid. Just before solidification of the last of the metal, the press should be speeded up, so that some of the segregated impurities will be forced

out at the top. The rate of travel of the press should be such as will keep the level of the molten metal always at the top of the ingot.

The proposal in the paper of using the top bloom of each rail ingot in splice bars is open to objection as these bars are an important part of the track-construction, and the use of avowedly inferior metal in them would be hard to defend should an accident result from the failure of one of them. The top rail made from a sound ingot should be practically as good as the others. In a rail mill the ingot compression would naturally be an addition to the stripping operation and could be accomplished in the same building. The cost of pressing should be much less than that of discarding an additional 30 per cent of the ingot, or even half of that amount.

Other Papers on Steel Rails

J. P. Snow, consulting engineer, Boston, in his paper on "Some Features of the American Steel Rail Situation", spoke of the change from acid to basic steel in recent years in this country. He said that segregation and longitudinal seams in the rail bases were the most common causes of breakages. He emphasized the difficulty of discovering a single cure-all for all rail defects. Mr. Snow's paper was published in full in the last issue of THE IRON TRADE REVIEW.

In his paper on "Notes on Features Associated With Tests of Steel Rails", J. E. Howard outlined the service stresses, the track conditions and the metallurgical features that should be considered. He said that so little is known as to what goes on in the rail in the track, that experiments should be conducted to determine what fiber stresses are to be met.

Dr. P. H. Dudley, consulting engineer of the New York Central lines, emphasized the importance of the ductility and elongation tests of steel rails, in his paper entitled "Testing Rails for Elongation and Ductility of the Metal Under the Manufacturers' Drop Testing Machine". By suitable measurements of elongation at the bend in a drop-tested rail, an indication of the excellence of the metal is obtained. These results are available within a few hours after the ingots of a melt are teemed and subsequent melts the same day can be improved accordingly. This method has been adopted as standard practice by the New York Central & Hudson River railroad. Dr. Dudley stated that a high percentage of ductility was almost a sure proof against breakages.

M. H. Wickhorst, engineer of tests, Chicago, outlined the various investigations now being made jointly in this country by the railroads and the rail manufacturers. He expressed his gratification over the manner in which the rail makers are co-operating with the railroads in an effort to develop a more serviceable rail section under all conditions. He said rail failures could be grouped into two general classes, head failures and broken rails and flanges. The first originates from metal taken from the upper part of the ingot; the second class seems, in general, to start in the bottom of the base and the train load tends to open the crack.

Prof. N. Belelubsky, of St. Petersburg, representing the Russian government, told of the specifications for steel rails in Russia that had been adopted in that country following tests of many rails and stated that the results of these specifications in service would be available at the next congress.

PRINCE SAGARIN, OF ST. PETERSBURG, AT THE LEFT, ONE OF THE SEVERAL REPRESENTATIVES OF THE RUSSIAN NOBILITY AT THE MEETING

Various types of rail breakages were shown in an illustrated address presented by Robert Job, of Milton Hersey & Co., Ltd., Montreal, entitled "Types of Rail Failures and Some Methods of Their Detection." Mr. Job expressed regret that the railroads were obliged to carry on exhaustive tests for the detection of imperfect rails, declaring that the rail makers should have the whole responsibility for the development of a perfect rail. He said he was confident, however, that the greatness of the steel industry would eventually bring about the placing of quality before quantity in production.

According to A. Mesnager, of Paris, in a paper on "Means of Foreseeing Ruptures in Rails", not enough importance is attributed to the known fact that rails sometimes present on their upper surface transverse cracks which form the starting point of fractures. The problem is how to perceive these fissures. On some rails they are visible without any special preparation of the head of the rail, but in other cases it is necessary to grind the surface of the rail with emery paper, after which a weak solution of hydrochloric acid or sulphuric acid, diluted with 10 times its volume of water, is spread over the rail for several minutes. The finest fissures are then visible. They can be still further developed by drying the rail after the above treatment and applying a tannin solution containing 3 per cent of gallic acid.

The committee on cast iron was unable to draft uniform, international specifications, although the English members made extensive experiments to ascertain the influence of the form of test pieces in testing the strength of materials. It was found that the results are influenced to only a slight extent, whether the test piece is shaped in accordance with the German, American or English standards. German and English manufacturers of pig iron displayed little interest in the formulation of international specifications providing for grading by an-

alysis instead of by fracture and the committee decided to postpone definite action for this reason.

Dr. J. E. Stead, Middlesborough, Eng., was the author of the report of the English members of the committee on testing cast iron. This covered an investigation on the influence of the shape of test bars on the mechanical properties of cast iron. Comparative tests were made on the standard bars of English, German and American section. Two series of bars were made at different foundries, one at Middlesborough and one in London. Four bars each of the English, German and American standard were cast from the same ladle of metal; two of each set were cast when about one-fourth the metal had been poured from the ladle and two of each when about three-fourths of the metal had been poured from the ladle. The transverse tests of the four German and four American bars, calculated to the equivalent load of the English bar, averaged 2,641 pounds for the English bars; 2,599 pounds for the German standard bar and 2,744 pounds for the American. The maximum difference in load of the English bars was 695 pounds; German, 48 pounds, and American, 192 pounds. The maximum difference of deflection in the English bar was 0.04 inch; in the German, 0.02 inch and in the American, 0.02 inch. The average tensile strength of the English bars was 24,983 pounds per square inch; German, 27,360 pounds per square inch and American, 27,288 pounds per square inch. Unfortunately, by an oversight of the molder, the English bars were cast flat instead of on edge, as is the usual practice.

To obtain the results from bars of an entirely different mixture cast under different conditions, a series of bars was made at the foundry of Young & Co., London. Six sets each of the standard bars were cast, four of each on one day from the same ladle and the remaining two each on another day. The average strength of the English bars was 3,057 pounds; German, 2,961 pounds and American, 2,910 pounds. The tensile strength of the English bars was 29,212 pounds per square inch; German bars, 29,940 pounds per square inch and American, 30,200 pounds per square inch. The average of all of the bars showed that the English test bar gives a slightly lower result than the German and American, the latter two being almost identical. However, if the unsound bars in the English series are omitted, the average of these is slightly higher than either the American or German. In this series the English tensile tests were made without removing the skin, as has been the practice for many years, whereas in the case of the German and American it was necessary to remove the skin to obtain a suitable specimen, apart from fulfilling conditions laid down in the specifications.

The members of the committee concluded that the results indicate that the shape of the bar has little effect on the physical properties providing the bars are sound, but it appears that there is a little more difficulty in insuring sound bars cast to the English section than in the case of either the American or German bars. In view of the small differences in results obtained with the bars of different shapes, the committee felt that the results do not call for any recommendation except that it considered it desirable that any bar for testing for deflection by transverse stress should not be less than 24 inches long. With shorter bars, it is difficult to measure to the required degree of accuracy except with very delicate measuring instruments and any slight error which would be liable to occur under ordinary works conditions of testing would be greatly magnified by using a shorter bar. The average analyses of the iron bars made at the foundry of Yourg & Co., Ltd., London, follow: Total carbon, 3.45 per cent; graphitic carbon, 2.711 per cent; combined carbon, 0.745 per cent; sulphur, 0.099 per cent; silicon, 1.493 per cent; phosphorus, 1.123 per cent; manganese, 0.413 per cent; arsenic, 0.012 per cent, and copper, 0.053 per cent.

The average analyses of two test bars made by Richardson, Westgarth & Co., Ltd., Middlesborough, Eng., follow: Total carbon, 3.191 per cent; graphitic carbon, 2.476 per cent; combined carbon, 0.715 per cent; sulphur, 0.132 per cent; silicon, 1.562 per cent; phosphorus, 1.233 per cent; manganese, 0.432 per cent; arsenic, 0.026 per cent, and copper, 0.024 per cent.

OFF FOR WEST POINT

Left to right:—Julius Castarijen, Duisburg, Germany; George Kiefer, Luterbach, Switzerland; Prof. Aug. Dommer, Lausanne, Switzerland; Edwin Bacher, Vienna; Alfred Deinlein, Vienna, and Mr. and Mrs. Rudolph Frey, of Switzerland.

Mechanical Tests of Cast Iron

C. Fremont, of Paris, suggested a new method for making mechanical tests on cast iron. Statical bending, tensile, impact and shearing tests were made on the same cast iron and these were repeated on a large number of pieces of cast iron of divergent origin. To make a comparison of the results of the tensile and bending tests, 140 bars were tested which were obtained from different foundries. From the heads of these test pieces small prisms were cut which were subjected to statical bending tests which recorded the amount of force applied. In general it was found that the two specimens of cast iron with an equal breaking strength under statical bending tests may vary considerably in tensile strength, the ratio in some cases being as high as 2 to 1. Since, in the bending test a prismatic test piece breaks by the tension exerted on the bent portion, concordant results should be obtained by both the bending and tensile tests when applied to the same cast iron. As this is not the case, it was concluded that some intervening cause must operate. Furthermore, this investigation indicated that the differences between the bending and ten-

sile results are undoubtedly due to the low elastic property which is inversely proportional to the strength of the metal.

To compare the results of bending and shearing tests, 267 fragments of cast iron were tested. That complete correlation existed between statical bending and shearing tests was indicated by plotting the results. On the other hand, tests were made for the purpose of comparing the results of the impact and shearing tests. It was found that there is no relation between the results of the impact bending tests and the shearing or statical bending tests. The great divergence between the results of the impact tests and of the statical bending and shearing tests is explained by the variation of the co-efficient of elasticity in inverse ratio to the tensile strength of cast iron.

Impact Bending Test

It was concluded that the impact bending test does not indicate the strength of cast iron and that the tensile test can never be performed with sufficient accuracy, as the test piece can never be pulled in an absolutely axial direction. Statical bending and shearing are the only mechanical tests capable of revealing the quality of cast iron. The manner of taking the samples for testing also is of great importance and it was further stated that tests applied to a test piece that is cast especially for that purpose, will give only approximate information on the quality of the metal. To obtain accurate information it is essential to take the test piece from the actual casting that is to be used ultimately in practice. The impact test was not considered essential for cast iron.

Testing Foundry Iron Mechanically

A method of mechanically testing foundry pig iron was recommended by A. Damour. He suggests that the specimens should be cast in hot sand molds and the metal should be at a temperature of 1,100 or 1,200 degrees Cent. The specimens should not be removed from the mold for at least two hours after they have been cast. The tests should be conducted uniformly on cylindrical specimens which should not be machined. Tests made by Mr. Damour indicate that by proceeding in this manner the same grade of pig iron will give practically constant results.

In a paper, entitled "The Estimation of Pig Iron", submitted by J. Kiel, manager of Ganz & Co., Danubius, Budapest, attention was directed to the necessity for the adoption of chemical analysis for the grading of pig iron in the place of judging the grade by fracture. While chemical analysis has largely superseded fracture grading in the United States, nevertheless, in England and Germany foundry irons are purchased on a fracture grading basis. Three grades are suggested as follows: No. 1, silicon above 2.60 per cent; No. 2, silicon from 1.6 to 2.50 per cent, and No. 3, silicon 1.50 per cent and less.

Grading Pig Iron

R. D. Wood, of R. D. Wood & Co., Philadelphia, in the discussion of the papers on cast iron and foundry pig iron, directed attention to the former method of grading by fracture. In the early days of the iron industry, when the uses of pig iron were limited largely to the puddling furnace and the cupola, fracture grading may have been satisfactory, but with the advent of the Bessemer and open-hearth processes and the introduction of chemical analyses in steel works, the purchase of pig iron by chemical analysis became necessary. He said that it would be impossible to grade pig iron, extending through the entire galaxy of purposes for which it is employed. He strongly urged that foundrymen consider the chemical analysis of pig iron only, in place of fracture, and added that there is a growing appreciation of the necessity for studying the physical properties of pig metal. Furthermore, he pointed out that grading by analysis is wrong, inasmuch as only one element can be considered and this usually is silicon, whereas, the other elements are of great importance and at the present time there is strong evidence that carbon is an important determining factor of the quality of cast iron. Referring to test bars, he said that the bar does not represent the quality of the casting, but the quality of the iron melted in the furnace for the casting; in other words, the so-called cast iron test bar is not a test of the casting itself, but of the quality of the iron poured into the mold.

Indications point to an early adoption of an international arbitration test bar for cast iron, as there seems to be a general agreement that the round bar gives the best results and efforts will be made to reach an agreement on the length of the bar. In Germany and England the bar employed is longer than that recommended by the American standard. The term "semi-steel", it was stated by several speakers, is misleading and at times is applied to low grades of malleable iron and frequently to cast iron containing various percentages of steel. Papers by Dr. Richard Moldenke, entitled "Commercial Tendencies in Malleable Casting Practice" and "Typical American Uses of Cast Iron and Methods of Testing" by J. J. Porter, both of which were published in the last issue of THE IRON TRADE REVIEW, were read in abstract.

A GROUP OF HAPPY DELEGATES ON THE GOOD SHIP SAGAMORE

Left to right:—E. Krause, Vienna; Fred Strobel, Vienna; Mr. and Mrs. Otto Zugmayer, Neid, Austria; Viktor Luftschitz, Vienna; Prof. Max Scheit, Dresden, and Prof. A. Rejto, Budapest.

Magnetic and Electric Properties of Steel.

A number of papers on magnetic and electric properties of steel were presented. These included "The Consideration of the Magnetic and Electric Properties of Materials in Con-

nection With Their Mechanical Test", by C. W. Borrows, "The Tensile Properties of Steel in Relation to Magnetic and Other Hardness Tests", by R. P. Devries, "The Magnetic Properties of Dynamo Sheets" and a contribution on "A Knowledge of the Relation Between Temperature and the Magnetic Properties of Iron and Steel". In discussing the magnetic properties of dynamo sheets, it was stated that measurements of permeability, resistivity and total loss were made on sheets of different chemical compositions after various mechanical and thermal treatments. The injurious influence of high carbon, and of hardening due to cold working was clearly apparent. It was shown that the steel should have less than 0.1 per cent carbon, 3 to 4 per cent silicon, less than 0.3 per cent manganese and sulphur and phosphorus less than 0.03 per cent. The sheets, after rolling, should be annealed at 750 to 800 Cent. with slow cooling. The rolling should be finished at a low temperature and after final annealing, no cold working should be allowed. A number of papers on endurance tests of steel and the properties of steel at high temperatures also were presented in abstract.

Versatile Linguists Address the Congress

Many accomplished linguists were in attendance at the Congress and foremost among these was Acting President Henry M. Howe. He welcomed the delegations of each country separately, first greeting the Germans and Frenchmen in a few words in their own languages. When he came to Russia, Scandanavia, and the Oriental nations, he returned to English, but the delegates from Hungary, Italy and Spain were welcomed in their respective tongues. This tribute in turn was followed by a short round of applause by the delegates from these respective nations.

As the abstracts of papers and discussions were presented in English, German and French, a number of honorary secretaries served as interpreters at the meetings of the various sessions. The facility with which Dr. W. Rosenhain translated the discussions into German, English and French excited great admiration. Others who served as interpreters included Dr. Richard Moldenke and A. Sauveur.

To facilitate intercourse among the delegates, the badges were provided with ribbons which denoted the languages spoken by their possessors —red for English, yellow for German, and blue for French. In addition, each badge was provided with a miniature flag of the country from which the delegate hailed.

Slag Enclosure or Sonims

"Slag Enclosures" and "Solid Non-Metallic Impurities in Steel" were the subjects of two papers presented respectively by Dr. W. Rosenhain and H. D. Hibbard. Dr. Rosenhain reviewed the experimental investigations of slag enclosures in steel and briefly referred to the large amount of work that yet has to be done before the relation of these enclosures will be fully known in steelmaking. He stated that practically nothing has been learned as to their solubility, particularly of iron oxide, in iron. Their elimination from the molten steel remains to be studied. Cracks, however, often result from causes other than slag enclosures. The paper suggests directions for the further investigation of this subject and will be published at greater length in an early issue of THE IRON TRADE REVIEW.

H. D. Hibbard, in his paper entitled "The Solid Non-Metallic Impurities in Steel," proposes the term sonim to designate what is variously called entrained slag, occluded slag, entrained silicates, oxidation products, etc. The generation, action and elimination of these impurities are discussed at length and many instances were cited where silica gave trouble in steel-making. This paper will appear in full in an early issue.

In the ensuing discussion, it was pointed out that the short word, sonim, has many advantages, particularly as distinguishing solid from the gaseous enclosures in steel. It was stated that an investigation of a number of enclosures in the middle portion of an ingot developed impurities consisting of sulphides and oxides of iron. Where aluminum was used to kill steel, alumina also was found in these enclosures. Dr. Heyn stated that in some small enclosures both alumina and calcium-silicide were found. He was of the opinion that the nature of the enclosure is of greater importance than its size. He referred to the large slag enclosures frequently encountered in bar iron, which are without deleterious effect, whereas frequently the most minute enclosures in steel result in fracture.

Dr. C. R. Richards, of Lehigh University, classified these impurities as slag enclosures, oxide enclosures and mattes. He recommended that the steel be permitted to rest and referred to the process of permitting the steel to remain in an electric furnace for one-half to one hour before casting. This was referred to in greater detail in the report of the opening session, published in the Sept. 5 issue of THE IRON TRADE REVIEW.

Dr. Walter Rosenhain did not agree with H. D. Hibbard in his recommended adoption of the term sonim to designate solid non-metallic impurities in steel. He pointedly asked Mr. Hibbard to inform him when a sonim is not a sonim. To this Mr. Hibbard replied: "A sonim is not a sonim when it is not in solution."

Corrosion of Iron and Steel Pipe

A symposium on the "Corrosion of Iron and Steel," particularly wrought pipes, included papers by F. N. Speller, entitled "Comparative Service Obtained With Wrought Iron and Soft Steel Pipes as Water Lines in the United States," "A Test for Relative Corrodibility of Irons in Water and Aqueous Solutions," by F. Lyon, and "The Action of Electrolytes on Metals Under Stress," by H. Baucke, while methods for testing steel tubes and wrought iron pipes were discussed by Chas. Fremont and A. C. Karsten.

F. N. Speller, of the National Tube Co., Pittsburgh, briefly compared the service results obtained with wrought iron and soft steel pipes as water lines in the United States. The number of comparisons includes considerably over 100 installations at several widely separated points and the investigations were made by many different observers. The extent of the corrosion varied from what was considered comparatively slight in some cases to the destruction of the pipe in others, the average length of service having been about 10 years. It was only in hot water lines where closed heaters were used that the pipes were seriously affected by corrosion during this period. The damage was found greater where more than the usual volume of hot water was being used. The conclusion arrived at, from these investigations merely corroborates that there is no fundamental difference in the corrosion of iron made by the various processes, at least so far as tubes are concerned. The close agreement between the long-time tests in service

recorded and so-called laboratory tests in aerated water is significant as indicating that the latter tests are reliable for many purposes, even though the samples are exposed only for a comparatively short time.

Gen. Wm. H. Bixby, chief of engineers of the United States army, contributed an interesting sidelight on the corrosion problem in the discussion of Mr. Speller's paper. He said that an excellent opportunity was afforded for investigating the action of sea water on metals by the removal of the battleship Maine from the Havana harbor. This ship was subjected to the corroding influence of salt water for a period of 12 years. Wherever the metals were in direct contact with the salt water, the electrolytic action had full sway and in one instance a watch was found to have been electro-plated with iron; on the other hand, practically all parts of the ship were coated with a slimy mud in the bottom of the Havana harbor, which served as a protective coating and retarded corrosion. The metals were found to be in an excellent state of preservation underneath this coating of mud, but as soon as the mud was removed and the metal was subjected to the action of the salt water and air, corrosion set in rapidly. One donkey pump was in such excellent condition after washing off the harbor mud that it was utilized as one of the auxiliaries for pumping out the vessel. Gen. Bixby explained, however, that the ship lay in still water and for this reason the coating of mud on the metallic parts was not disturbed. If there had been a current, it is probable that the mud might have been washed off and corrosion then would have set in actively.

The Decay of Pipes

Capt. Wm. R. Hunt stated that the subject of the decay of metal pipes is of great importance. He said that hundreds of tests have been made of iron and steel pipes under practically the same service conditions and not only was an analysis made of the material used in the pipes, but the soils and water likewise were analyzed. He added that the results were disappointingly conflicting. Dr. Heyn stated that the loss of weight by corrosion is entirely independent of the purity of the material. He pointed out that it is difficult to generalize on the general subject of the corrosion of metals as tests on wrought iron, steel and cast iron indicate widely varying effects of corrosive influences. The speed of corrosion, likewise, is difficult to predict. He cited an instance of wrought iron and steel pipes, used in a water system, in one set of which the water flowed continuously while in the other it flowed intermittently. It was found that the corrosion of the iron and steel pipes in the line in which the water flowed intermittently was much greater than where it flowed continuously. He believed that this was due to the fact that the metal in the intermittent pumping system was alternately exposed to air and water which greatly increased the speed of corrosion. On the other hand, the pipes in the line in which the water flowed continuously were not exposed in this way.

Dr. Henry M. Howe contributed a written discussion, in which he pointed out that the impure iron referred to by Mr. Speller is wrought iron, impure through the presence of much cinder. The pure iron recommended is not wrought iron, but a very low carbon, open-hearth steel, known as ingot iron. He added that it is extremely probable that all impurities, as such, tend to hasten corrosion by creating local differences of potential and consequent auto-electrolysis. But there is one impurity, the cinder of wrought iron, which has, in addition, a mechanical impeding action. In case of steel, including the so-called ingot iron, the small quantity of slag present is not so distributed as to have any protective action comparable with that of the cinder of wrought iron; hence, in steel, all impurities, cinder included, probably hasten corrosion. The impression which the evidence gives is that, though improperly made steel may readily corrode faster than properly made wrought iron, properly made steel does not.

A new testing method for steel tubes was outlined by Chas. Fremont, who suggested the application of the notched-bar impact test to tubes. A narrow ring of the tube is fastened, doubled to U-shape, notched by a saw cut and is tested in the Fremont impact testing machine. F. N. Speller, of the National Tube Co., did not agree with the author and stated that the methods for testing wrought iron pipes and tubes in this country have proved eminently satisfactory. These consist of flattening and bending tests, or both, on crop ends of the tubes. The tubes then are subjected to an internal pressure test of 750 pounds or more. He added, that both lap-welded and butt-welded pipe are used extensively in this country,

President Taft Endorses Work of Testing Engineers

In his address of welcome, Brig. Gen. W. H. Bixby, speaking alternately in English and French, said:

"President Taft has always taken great pleasure in attending and assisting all congresses which have for their object the promotion of peaceful arts throughout all the nations of the world. He believes that the natural progress of the world should be toward a point where the best defenses of the country against its neighbor will be the strength of their mutual manufacturing, commercial and personal interests.

"He realizes fully the need of thorough inspection of all materials to determine their qualities and capabilities as well as the need of the establishment of thorough tests which shall prevent the use of improper and inefficient materials, shall establish the use of the most efficient and shall point the way toward future improvement, wherever possible, of not only the materials themselves, but also the methods of their use.

"Nearly all of our manufacturers, our business establishments, our farms, our habitations and even the safety of our lives depend today, in great measure, upon the quality of iron, steel and cement. It is not surprising, therefore, that the discussion of these materials will occupy a great part of the time of this congress. In matters of international cooperation, the United States, by reason of its youthful position among nations, starts late, but it is desirous of giving liberal assistanse to all such work, bringing to it the enthusiasm of youth.

"When the foreign members leave this country, we hope that they will carry with them a conviction that the United States in its daily work is looking forward to the time when all countries shall have ideals equally worthy and in harmony with each other, methods of work as perfect as allowable under their differing local conditions and international relations such as belong to a common brotherhood having in view the best results to the world as a whole."

whereas, seamless tubes are largely used abroad. Mr. Speller was of the opinion that the tensile test is of little importance when applied to pipe material. A. C. Karsten commented on the Danish specifications for wrought iron pipes and opposed the criticisms advanced by C. Fremont to the specifications for steam, gas and water tubes formulated by the association of Danish engineers. The newly proposed Fremont test for tubes involves cutting-off the narrow ring at the end and testing it by an impact test which Mr. Karsten said is inapplicable to this class of tubes, because their ends are threaded.

Action of Electrolytes on Metals Under Stress

H. Baucke, of Amsterdam, in a paper on "The Action of Electrolytes on Metals Under Stress", stated that recent electro-chemical researches, relating to corrosion problems, have proved the existence of differences of potential between electrodes of one and the same metal, that have undergone different mechanical and thermal treatment.

The paper, in part, is as follows:

According to Spring a cold-rolled bar of a metal, when united with the other half of the bar, in the annealed state, to form a cell, filled with a suitable electrolyte, will give an electric current, the annealed half forming the cathode. This phenomenon forms a special example of the general rule, that in cells containing as electrodes two pieces of the same metal, one in a stable and the other in a metastable condition, the metastable form becomes the anode and the stable form the cathode.

On this electro-chemical principle, it may be concluded, that an electrolyte, in contact with any metal in a metastable condition will accelerate its transition into the stable form. Even simple contact with the stable form of the metal will have the same effect. The common tendency of metals under stress to return to normal conditions, under the action of an electrolyte was first systematically studied by E. Cohen, who gave the phenomenon the name of "stress-sickness". From this point of view no stressed metal whatever can be said to be in a state of complete stability, and the question arises as to whether stability exists at all in metals that have been rolled cold, or even hot, especially when exposed to the action of electrolytes, numid air and saline liquids, etc. E. Heyn and O. Bauer proved the existence of considerable tension in boiler plates, and in the rolling of steel care must be taken to avoid over-rolling. Internal tension in metals may arise from sudden cooling and from mechanical forces in practical application. Mr. Baucke deals particularly with the cases of balls in ball bearings, and with boiler plates, as being of special practical interest. He found that steel balls in a centrifugal bearing are liable to break, the percentage of broken balls being considerable even after a short period of use.

The present system of heating boilers frequently results in the cracking of the boiler plates. Cracking occurs more especially in the case of marine boilers heated with oil fuel and subject to forced draft. The typical feature of cracked boiler plates submitted for examination is a continuous crack across a row of rivet holes. Cracks not connected with the edges of holes were only twice observed in the body of the plate. Cracks are generally found in steel plates, having been found only once in wrought iron plates. Both mild and hard steel are subject to cracks, but cracked plates especially rich in phosphorus were not encountered. Cracked plates high in sulphur were met with twice. In regard to other impurities fair results of chemical analysis are no guarantee of the durability of boiler plates, and cracks may be found in even very pure steel.

In regard to resilience, the tests showed wide divergences. Some plates have a low resilience, both in the material between the rivet holes and in the body of the plate. Annealing at 900 degrees Cent. did not increase the resilience. Other plates gave satisfactory results in both zones excepting a few low results with the material taken from between the rivet holes. A third type showed low resilience between the rivet holes and fair values in the body of the plate.

In conclusion, the cracking of boiler plates must be considered as a symptom of fatigue, the metal trying to recover its character as a crystalline solid. In fatigued plates the formation of flaws may also be induced by the action of an electrolyte. The cracking of boiler plates is not directly due to bad quality of the material; it occurs with steel of good quality as well as with inferior steel. The phenomenon is primarily due to abnormal tensile stress.

Pennsylvania Railroad Tests

Paul Kreutzpointer, Altoona, Pa., in discussing the effect of heat on steel boiler plate, said that for many years he was in charge of tests of this material and the results indicate that heat relieves the internal rolling stresses. The defects found were traced to the boiler shop and resulted from bending, riveting, etc. It was the practice to cut test pieces from new boiler plate and from the discarded boilers. The results of the tests of the two samples were compared and it was found to be invariably true that defects resulted from bad boiler shop practice.

Hardness and wear tests, as well as impact tests, were considered in a number of papers on these various subjects. The report of committee 26 on impact tests was presented by G. Charpy, and the conclusion arrived at was that the tensile test would appear to indicate a normal metal, but the impact test on nickel bars shows the resilience to be extremely low, probably on account of the high phosphorus content of the metal.

Proposals of Committee

The committee proposed that its mission should be continued until the next congress and should be limited to the following points:

1. Collating the results of comparative bending tests performed on nicked bars of different dimensions, with a view of establishing a formula or table of comparison. The committee is of the opinion that the principle adopted by the Copenhagen congress of employing two geometrically similar bars, should be retained for the present.

2. Collating descriptions of the various existing apparatus suitable for impact tests, including the mode of graduation and verification, and, if possible, the results of comparative tests performed with different apparatus.

3. Forming a collection of observations relating to machine or structural parts which have behaved abnormally, or have given rise to special remark while in practical use, and that have been subjected to nicked-bar impact tests.

Abstracts of the other papers on the subjects of hardness and impact tests follow:

"Hardness Testing and Resistance to Mechanical Wear," by E. H. Saniter.—That while a high Brinell number may be expected to give better wear there are so many exceptions that its use for the purpose of indicating wearing properties is unreliable as far as the methods of wear testing reviewed are concerned. The relation of either Brinell tests or wear tests to wear in actual practice requires investigation.

The greater reliability of the wear test as an indicator of wear is emphasized by the test on Hadfield's manganese steel which gives, with a low Brinell number, the best wear number of all the steels tested.

The excellent wearing properties of manganese steel rails are well known, but have only lately become generally recognized, although rails from blooms made by Sir R. Hadfield were rolled at the Creusot works as far back as 1906.

"Wear Tests of Steels", by F. Robin.—Summary of wear tests made in 1909 and reported before the Iron and Steel Institute. Paper, coated with abrasive powder, was used. This wear test has been found useful for rails in certain service, files, crushers, etc. The results of different forms of wear tests do not agree and each kind of wear must be covered by special test.

"Tests for Hardness, Elastic Limit and Resilience Under Impact", by R. Guillery.—A method was described

yielding hardness, elastic limit and resilience, as a substitute for the tension test. The ordinary tension test defines the strength of the metal under tension, the elastic limit and the elongation, and gives numerical values for these qualities. The breaking strength does not define the true strengths of the metal and the tension test does not absolutely fix the true strength. The hardness figure of Brinell can and should replace the tensile strength yielded by the ten sion tests. The usual tension test defines the apparent limit of elasticity, which is also given by the new method with desirable precision. Resilience, which is the converse of brittleness, is not defined by the tension test. An experienced operator can, from an examination of the tension bar, express an opinion as to the brittleness, but he cannot assess any definite value. The old impact test on smooth bars also specifies the brittleness imperfectly. The new method of testing brings out and determines numerically, the resilience, a function of the first importance, with regard to which the old tests merely gave indications, devoid of any precision, and based upon an appreciation of the state of the grain or of the aspect of the bar. The tension test defines and determines quantitatively, the elongation of the metal, but it is evident that the elongation is represented in the resilience. In brief, the tension test and the old impact test may be advantageously replaced by the new method. The latter gives the true hardness of the metal more exactly; gives the elastic limit with at least an equivalent precision and also gives with precision the resilience, a valuable quality of which the old method gave merely a very vague idea and which comprises in its quantitative value the function of elongation.

Separate machines have been devised for each of these three tests. In the hardness test for applying the method of Brinell, an elastic mattress, formed of a number of springs calibrated to the desired load for a predetermined degree of flattening, is used. This apparatus consists of a curved standard, in the lower portion of which is the elastic mattress. Balls of various sizes are used for the impressions. For the elastic limit test, the process consists in causing a ball, which is solidly encased and which is being acted upon by a constant force, to glide on one or several generatrices of a crushed cone, which has been filed down. If the depth of the furrow is registered by a magnifying device, the point where the increase in hardness sets in can be found. In testing for resilience, the apparatus is based upon the variation of the energy accumulated in a flywheel.

Studies of Steel Hardness

"Studies of Hardness of Steels", by C. Grard.—Hardness tests may be used in place of tension tests, by multiplying the hardness number by a constant, or they may serve for tests of homogeneity. Studies of the attainable precision of the Brinell hardness test showed that the errors of observation can be reduced to a maximum of five units of hardness number. Steel generally should be hardened and then annealed, before applying the Brinell test. The author considers it practicable to specify hardness and impact test requirements in steel specifications.

Brittleness Test

"Remarks on the Brittleness Test", by M. Derihon.—The author presented some interesting observations based on tests made by his firm. He stated that since 1904 he has used the drop weight and Fremont test piece and that the experience has been such that they have decided not to abandon them. From 10,000 to 12,000 pieces per month are tested. He believes that after a few attempts it is possible to make all steels of good medium quality, non-brittle, and that the whole question is merely a matter of heat treatment. His experience leads him to maintain that the brittleness test is less severe than is generally supposed and that it enables non-brittle steels to be readily obtained by a suitable process of grading. He prefers the small test piece of the Fremont type, which reveals local defects forming the germs of future cracks.

"Notched-Bar Impact Tests of Tough Steels," by A. Gessner.—Comparative experiments with nicked-bar impact tests on tough steel test pieces of standard shape, 10 mm. thick, have shown that the numerical value obtained is largely influenced by the type of rupture, so that differences up to 50 per cent may appear with one and the same material. Furthermore, in the case of tough forged steels, the results are considerably influenced by injuries produced by the edges of the hammer used in the standard pendulum tester and leading to differences of up to 25 per cent in a series of tests performed with a second type of hammer which prevents the occurrence of such injuries.

Resilience

"Resilience, a Discussion of the Results Obtained in the Testing Laboratory of the Paris, Lyons & Marseilles Railroad".—An impact-testing machine was described in which the residual energy of fall is measured by the length of trace made on a card, released at the moment of rupture, by a pen which is deflected when a circuit is broken by the ram at a fixed distance below the test piece. Numerous tests with this machine showed: (1) The true resilience (consumed energy per unit of sectional area) is less with small height of fall than with greatly excessive height of fall. (2) For the same energy of fall, a heavy ram gives lower resilience than a light ram. (3) A sharp notch gives lower values than a notch of other form, and the difference is greatest for relatively fragile metal. The experiences in this laboratory teach that metals are too heterogeneous to permit of specifying or accepting on notched-bar impact tests.

While it was the prevailing opinion of the foreign contributors to ultimately replace the tensile by the hardness test, nevertheless some of the American members advised the postponement of any definite action along this line. The impossibility of making comparative impact tests by the different machines now on the market was pointed out and it was suggested that the different types if machines for this test be standardized so that the results of tests on one machine can be compared with the results obtained on any other impact testing machine.

"Progress in Testing Full-Size Pieces Under Practical Conditions in the United States," was discussed by G. Lanza. The large testing machines in this country are listed and the chief work done on them is outlined. This paper, in part, will be published in an early issue.

Fire Tests of Floors in the United States.

A paper on "Fire Tests of Floors in the United States", was presented by Ira H. Woolson, consulting engineer for the National Board of Fire Underwriters, and Rudolph P. Miller, superintendent of buildings, New York City, the object of the paper being to give a brief history of the development and extent of fire-testing in the United States, and to embody in condensed form a record of all fire tests upon floors, which were obtainable. It is said, that so far as known, the first practical fire tests ever made upon full-size units of modern fire-resistive construction, were conducted in New York City in 1896, by a group of technical societies, to determine the merits of cast iron and structural steel columns when subjected to fire in a loaded condition without being encased in fireproofing material. Shortly after this the bureau of buildings of New York City began a series of experimental tests to ascertain the fire-resisting value of various new methods of construction then being urged for use in the city. Since that time probably more fire tests upon structural materials have been made in that city than in all other cities of the world combined.

In 1902 Prof. Ira H. Woolson established a permanent fire-testing station at Columbia University and since then most of the tests have been conducted there, usually in cooperation with the bureau of buildings. Unfortunately only a limited number of these test reports have been published. The testing station at Columbia University was originally located near the university buildings and consisted of two large test cham-

bers for floors and a third for partitions; however, it is now located at Greenpoint, borough of Brooklyn, and consists of two buildings, one for floors and one for partitions.

Work at Chicago

The Underwriters' Laboratories, at Chicago, were established in 1901, have since grown to large proportions and have become a great force in controlling the quality of all kinds of fire-protection devices, fire department equipment and types of fire-resisting construction. In the latter class their work has been confined largely to tests of doors, window shutters, wired glass windows and roofing materials. A limited number of partitions and floors has also been tested. A furnace is now being completed to make tests of full size columns carrying full working loads.

Complete tests have been made upon full-size units of fireproof construction as follows: Six floors, 13 partitions, 54 roofings, 273 metal window frames, sash and wired glass, and 209 various types of doors. The specifications for these tests were practically those which are now the standard of the American Society for Testing Materials. Wood was used for a fuel, the time of test was usually four hours and water was always applied by city firemen with service apparatus. Following are the test requirements: Size of nozzle, 1⅛ inch; pressure at the nozzle, 60 pounds; range of stream, 10 to 20 feet; load during test, 150 pounds per square foot; load after test, 600 pounds per square foot.

Discussion of Fire Tests

In the discussion of fire tests of floors, the use of cinders in concrete for roofing purposes was opposed for the reason that on a large building in St. Louis the material expanded 2 inches in 100 feet, resulting in forcing out the side walls. Mr. Woolson replied that he had never experienced difficulties of this nature and said that he had found that cinder concrete, owing to its porosity, expands less than any other concrete mixture. He believed that it was probable that the roof expansion referred to might be traced to the metal reinforcement. The statement made by Mr. Woolson to the effect that limestone will not withstand fire very well when used in concrete, was questioned.

Following the reading of the paper on "Researches on Bearing Metals," by N. Pecoraro, a report for sub-committee B-2 was submitted by G. H. Clamer, second vice president and secretary of the Ajax Metal Co., Philadelphia. This sub-committee was appointed by the American Society for Testing Materials for the purpose of investigating and studying the various base metals used in the manufacture of anti-friction alloys. At present the sub-committee is working with a view to determine the various properties and physical characteristics of the different metals both at the ordinary and at elevated temperatures. Mr. Clamer mentioned the following five mixtures as being very satisfactory for bearing metals:

Tin, 89 parts; copper 4 parts, and antimony, 7 parts.

Tin, 83 1-3 parts; copper, 8 1-3 parts, and antimony, 8 1-3 parts.

Tin, 50 parts; copper, 2 parts; antimony, 12 parts, and lead, 36 parts.

Tin, 7 parts; antimony, 17 parts, and lead 76 parts.

Antimony, 10 parts, and lead, 90 parts.

Adoption of Bearing Metal Specifications.

Mr. Clamer stated that the committee's intention is to determine ultimately just what results will be obtained from all possible variations in the proportions of the metals used in these mixtures. This work, however, can not be finished for a long time and in the meantime the subcommittee recommended that the mixtures mentioned be used and that these mixtures be embodied in a set of standard specifications, the adoption of which it recommended.

Dr. Fritz Cremer called attention to the surface conditions and characteristics of babbitt metals. He stated that his experience had led him to believe that mixtures containing 20 per cent of hard metal and 80 per cent of soft metal are more efficient than babbitt metal which is entirely homogeneous.

The presentation of the paper on "The Effect of High Temperatures on the Physical Properties of Some Alloys," by I. M. Bregowsky and L. W. Springs was followed by an interesting discussion by Capt. N. Beliaeff, of St. Petersburg, Russia, who told of the effect on the interiors of gun tubes of the high temperature created by the firing of a charge. The sudden expansion in the inner surfaces brought about by these great changes in temperature brings about the formation of a network of fine fissures in the interior of the tubes. These fissures, in the course of time are enlarged to such a degree that the gun finally becomes unfit for service. In order to overcome this difficulty, two solutions are possible: The discovery of a powder which can be discharged without generating a temperature higher than 1,000 degrees Cent., or the discovery of a soft metal which could bear up under the unequal expansion and contraction.

Harold Derine and Charles B. Spencer presented a written description of a method devised by them for determining the physical properties of alloys at high temperatures.

New Method of Testing Welds.

An interesting paper on "A New Method of Testing Welds," prepared by C. Fremont of Paris, was presented. The author conducted experiments on selected welds that had been made by skilled blacksmiths in France and elsewhere. For convenience and cheapness in industrial practice, many iron and steel articles are welded by forging. It was stated that practical men admit that when the welding is successfully accomplished, the strength of the article is as great at the weld as in the natural metal and that consequently, a properly welded article is as strong as though forged in a single piece. The blacksmith assumes that in the process of welding the two pieces should interpenetrate and should result in a homogeneous texture. It seemed desirable to provide a method of examination that will reveal the quality of a weld without injuring the articles themselves. The author first attempted to determine the strength of forged welds in order to ascertain the limits between which this strength is likely to vary.

Inferior Strength of Welds

The impact test was used and all pieces exhibited strengths inferior to that of the natural metal. In most cases the test pieces fractured in consequence of the weld opening, the strength being insignificant. In the case of a test on a boiler plate, where an oxyacetylene weld was carefully made by a skilled workman, with added metal, the weld was so good that it was only after prolonged etching that the micrograph could be obtained. In summing up the author states that "forged welds, even when perfectly successful, of which there is no proof in practice, are always weaker than the metal, the weld being merely a more or less perfect adhesion, which explains the number of fractures of welded articles while in use. Hence, welding should not be allowed, unless the accidental fracture of the article will not be attended with danger."

Mr. Fremont's paper precipitated an interesting discussion. Max Bermann objected to Mr. Fremont's method on the ground that it could not be employed without damaging

the weld and hence had no practical value. Dr. Archibald Denny stated that the author had been too sweeping in his statement that welding should not be permitted, and Mr. Denny mentioned several cases, especially in ship building, in which the use of welds could not be dispensed with. R. H. Danforth called attention to the manufacture of tubes by the lap-welding process and stated that this industry would be wiped out of existence if welding were to be discontinued. Dr. Walter Rosenhain was of the opinion that welding should only be employed in cases where the failure of the weld would not give rise to grave danger or loss of life. Prof. E. Heyn stated that it was perfectly possible to produce good welds and that much was dependent on the quality of the material used, proper heating, etc. He was of the opinion that Mr. Fremont has condemned welding with too much freedom.

The report of L. Guillet for committee 38, on "Principles of Specifications for Copper", was referred back to the committee.

Physical Significance of the Elastic Limit

In a paper on "The Physical Significance of the Elastic Limit", H. F. Moore, of Urbana, Ill., stated that the term elastic limit is used with at least four different meanings.

1. The least stress at which a material retains permanent deformation after the removal of stress. This is sometimes called the point of first set.
2. The least stress at which Hooke's law ceases to be exact. This is sometimes called the limit of proportionality of stress to deformation.
3. The least stress upon release of which there occurs a transformation of some of the stored mechanical energy to heat. This may be called the energy limit or the thermal limit.
4. The least stress under which ductile materials exhibit a sudden marked yielding. This is usually called the yield point.

Mr. Moore stated that many writers do not distinguish clearly between these several kinds of elastic limits, leading to confusion, and that a standard and distinctive nomenclature should be established. He further says that "the point of first set taken from the first observation which shows set is of doubtful value in determining the elastic properties of materials since small sets, generally caused by non-homogeneity or initial stress, are found after an application of a very low stress." It is his opinion that the determination of the point of first set should be made from a curve plotted from a series of observations. He says that this involves no small labor, but it generally enables a distinction to be made between sets caused by non-homogeneity and initial stress and sets caused by plasticity of material. From such a curve a very early stage of plastic action in the material may be detected, and a limit may be chosen to be used as a criterion of static strength properties of ductile materials.

New Method of Testing Steel Wire

In a paper on a "New Method of Testing Steel Wire", C. Fremont, of Paris, stated that every day there occur instances of the accidental breakage of steel wires that have been in use for a great variety of purposes, in mines, aerial ropeways, railway signal wires, etc. These sudden breakages are generally ascribed to the fatigue of the metal, whereas in reality they are due to piping and impurities. The method of testing by successive bendings, and also the tensile test when applied by impact, cannot reveal the brittleness of steel wires. The only satisfactory test, according to the author, is that of impact bending applied to the nicked wire. For carrying out these tests on wires which sometimes are less than 1 mm. in diameter, it was necessary to devise a special method, which consists in reinforcing the test piece all along the portion which should not bend. It is stated that this new method of testing steel wires has been successfully applied to a number of specimens of railway signal wires, mine ropes, aerial tramway cables, etc.

The report of the committee on nomenclature of iron and steel products, submitted for adoption by Dr. Henry M. Howe, chairman, precipitated an animated discussion. He said that the report represents six years of painstaking work and almost endless correspondence with members located all over the world. The report, in part, was published in the last issue of THE IRON TRADE REVIEW.

What is Steel?

Dr. Howe directed attention to the two definitions of steel which had been submitted, the one known as the official, while the other represented the views of the British members. The official report defines steel as "iron which is cast from the molten state into a mass which is usefully malleable initially, at least in some one range of temperature". It was explained that such metal is steel whether it can be hardened or not, whether it contains much or little or even no carbon, and for that matter, even if it is chemically pure iron. It is sometimes called ingot metal.

The British members defined steel as "iron either pure, or associated with other elements, which has been cast from the molten state, whether it hardens or not on rapid cooling from above its critical range and after solidification is so usefully malleable that it can be forged or rolled into merchant sections or shapes, at least within some range of temperature." It was explained that such metal is steel whether it can be hardened or not, whether it contains much or little or even no carbon, and for that matter if it is chemically pure iron.

Dr. Allerton S. Cushman vigorously opposed the acceptance of the report and while he did not state that the definition of steel would classify ingot iron under steel products, nevertheless this was the sense of his contention. The protest attacked the effort which was being made to classify an iron product as steel and while the motives of the members of this committee were not questioned, yet Dr. Cushman felt that one section of the society should not pass upon so important a question, even though it would be submitted ultimately to the members of the association for final action.

Other Definitions of Soft Steel

H. D. Hibbard said that pure iron, if made by the fusion process, would have to be called steel and he asked Dr. Cushman whether ingot iron does not more nearly approach steel than iron. Dr. Cushman, in his reply, stated that ingot iron is the nearest approach to the chemical element iron which has ever been manufactured on a large scale, in heats of 80 tons, although he admitted that chemically pure iron had been made in smaller masses.

Dr. N. Belelubsky, head of the Russian delegation, said that in his country the term soft steel is not employed, but instead it is defined by a word which is analogous to ingot iron and he favored the acceptance of that term. Dr. Howe contended that for 40 years the term steel defined the product made by the fusion process regardless of the amount of carbon which it contains and he pointed out that steel containing only 0.004 per cent of carbon had been made which closely approached chemically pure iron. In defining steel, he said that the committee was reporting merely the established usage of the term.

Dr. Cushman offered an amendment to Dr. Howe's motion and demanded that the report be laid on the table.

Prof. A. Martens, of Germany, heartily supported the amendment and stated that if the definition of steel be adopted as defined, it would seriously involve the German nomenclature of iron and steel products. He urged accuracy instead of haste in all of the work of the International Association. Dr. E. Heyn recommended the adoption of a third definition of steel to meet the views of the contending parties.

Dr. Howe then withdrew his motion and suggested that the report be considered as one of progress and that the committee be discharged for the reason that, as constituted at present, it was too unwieldy owing to its large membership. He added that the report represents the work only of a small part of the committee members.

It was evident that if the report had been submitted to a vote of this section it would not have been adopted, as the French, German and Russian delegates were not favorable to the British or the official definition of steel. Its adoption would have resulted in the classification also of ingot iron as steel.

Microscopic Constituents of Iron and Steel

The report of the committee on the microscopic constituents of iron and steel was accepted without discussion and was referred to the council of the association for final action. Definitions of the more important of these constituents follow:

Austenite.—The iron-carbon solid solution as it exists above the transformation range, or as preserved with but moderate transformation at lower temperatures, by rapid cooling, or by the presence of retarding elements (Mn, Ni, etc.), as in 12 per cent manganese steel and 25 per cent nickel steel.

Cementite.—Tri-ferrous carbide, Fe3 C. The name is extended by some writers so as to include tri-carbides in which part of the iron is replaced by manganese, or other elements. Such carbides may be called "manganiferous cementite", etc.

Martensite.—The early stage in the transformation of austenite characterized by needle structure and great hardness, as in hardened high-carbon steel.

Ferrite.—Free alpha-iron.

Osmondite.—That stage in the transformation of austenite at which the solubility in dilute sulphuric acid reaches its maximum rapidly. Arbitrarily taken as the boundary between troostite and sorbite.

Ferronite.—Solid solution of about 0.27 per cent of carbon in beta-iron.

Hardenite.—Collective name for austenite and martensite of eutectoid composition. It includes steel when above the transformation range and when hardened by rapid cooling.

Pearlite.—The iron-carbon eutectoid, consisting of alternate masses of ferrite and cementite.

Graphite.—The free elemental carbon which occurs in iron and steel.

Troostite.—In the transformation of austenite, the stage following martensite and preceding sorbite and osmondite if this stage is recognized.

Sorbite.—In the transformation of austenite, the stage following troostite and osmondite, if this stage is recognized, and preceding pearlite.

International Specifications

The report of the committee on international specifications for iron and steel was presented by Dr. A. Rieppel, chairman, of Nuremberg, Germany. A report was submitted of the meeting of a sub-committee held in London on May 8, this year, and the English and German members in attendance voiced the sentiment that international specifications before they can be adopted must represent an advance over existing specifications of the different countries. It was the unanimous opinion of the members of this committee that the time had not yet arrived for making recommendations for the adoption of international specifications and the committee requested that its work be continued.

Resolutions

Resolutions prepared by the various sections were submitted for adoption at the closing session held Saturday morning. These included a request for the co-operation of the various governments in the work of the internatoinal association; instructions to the committee on international specifications for iron and steel to continue its work of collecting data which is to be submitted, from time to time, to the council of the organization for consideration; the committee on impact tests was requested to continue its work and to present to the next congress definite information on the height of drop, weight of the anvil, dimensions of notched bars, methods of measurement for the impact test, etc.; the committee on principles of specifications for copper was instructed to continue its work and was requested to make an investigation of copper alloys and to report its results at the next congress; the report of committee No. 53 on the microscopic constituents of iron and steel was adopted; it was recommended that a uniform system of reporting accidents of concrete and reinforced concrete structures be adopted by the various countries to permit of studying the causes which lead to the collapse of these structures; an investigation of fireproof building construction, also was recommended and it was suggested that the committee in charge of this work ascertain the effect of fire at various temperatures upon concrete and reinforced concrete. This data is to be gathered all over the world and a report is to be submitted at the next congress. It was recommended that the round test bar be used for cast iron and the committee was continued.

Amendments to the bylaws which were favorably acted upon and reported to the council for action provided for the establishment of life memberships at a cost of £15 or $75 each. The election of more than two vice presidents, as at present, was recommended to the council.

Election of Officers

Capt. Robert W. Hunt was elected to the council, representing the American membership of the association. The cordial greetings of the sixth congress were extended to Mrs. Chas. B. Dudley, widow of the late Dr. Dudley, who was elected president of the association at the fifth congress held in Copenhagen. Dr. Henry M. Howe, acting president of the association, was elected to life membership.

Dr. N. Belelubsky, privy counsellor, engineer, professor emeritus of the Institute of Engineers of Ways of Communication under Emperor Alexander I and head of the Russian delegation, was elected president of the international association. The seventh triennial congress will be held in St. Petersburg, in 1915.

The formal reception to the members of the congress held at the Engineering Societies building on Monday night was one of the most magnificent functions of the week. It was held under the joint auspices of the American Society for Testing Materials, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers and the American Institute of Mining Engineers. On Tuesday evening the delegates visited the New York public library under the guidance of the city officials.

Other Entertainment Features

The excursion Wednesday afternoon to the United States military academy at West Point, was largely attended. The steamer Sagamore was chartered for the occasion, luncheon and dinner having been served on the boat. The American Society of Civil Engineers informally received the visitors on Thursday evening and on Saturday afternoon the Museum of Natural History was visited. The

week's entertainment was concluded with a reception to the members of the testing congress at the Metropolitan Museum of Art.

The Official Tour

A party of nearly 250, consisting largely of foreign visitors, left New York Sunday on an official tour of the principal eastern cities. Washington was the first stop, two days having been devoted to visits to points of interest. Wednesday was spent at Pittsburgh where the plants of the National Tube Co. and the Carnegie Steel Co., were visited, and on Thursday an inspection will be made of the laboratories of the United States bureau of mines in that city. Friday and Saturday will be devoted to the inspection of industrial plants at Buffalo and Niagara Falls and the trip will terminate at New York on Sunday, Sept. 15. A handsomely illustrated official guide of this tour, bound in limp leather and prepared by the committee on information of the sixth congress was distributed to all of the delegates.

SHORTAGE UNLIKELY

In Ore Reserves States Recognized Authority.

The second of a series of articles by Edwin C. Eckel, on "Iron Ore Reserves" in the September number of the *Engineering Magazine*, points out that while inroads are being made into American reserves at steady rate, yet there is no possibility of a shortage of ore in centuries, even although the average ore grade is likely to deteriorate steadily.

After pointing out the absurdity of the Tornebohm estimate of the world's reserves, which was published by the Swedish geologists in 1905, crediting the United States with only 1,100,000,000 tons of "workable deposits", the writer calls attention to other estimates including the Hayes figure of 4,788,150,000 tons, and the estimate published by J. G. Butler Jr., in which he was assisted by John Birkinbine, in 1909, it placing the figure at 4,462,940,000 tons. Eckel himself then gives his idea of the possibilities of the United States ore reserves, which is 5,200,000,000 to 7,550,000,000 tons, as including only ores of present-day commercial grade.

Bonds Sold.—The Republic Iron & Steel Co. has sold to Blair & Co., New York, $2,000,000 of 5 per cent sinking fund bonds, due in 1940. The bonds are being offered at a price to yield 5½ per cent and are part of an authorized issue of $25,000,000, of which $13,305,000 are now outstanding. Application has been made to the New York Stock Exchange to list the $2,000,000 bonds.

AUGUST SHIPMENTS

Of Ore Heaviest in History of Great Lakes.

Ore shipments amounted to 7,760,248 gross tons during August, the highest record of any month in the history of lake traffic, and making the third month this year in which the 7,000,000-ton mark has been exceeded. During June last, the fleet moved 7,600,283 tons, in July 7,567,555 tons. This movement was carried practically in contract ships, though the ore shippers would have been glad to charter more wild tonnage, if possible. However, the grain trade has been so attractive that there is little outside tonnage to be had. The movement to Sept. 1, is 29,051,162 tons as against 19,606,068 tons to Sept. 1, 1911, an increase of 9,445,084 tons. The August movement marks the passing of the 1910 record, when up to Sept. 1, 28,827,029 tons were moved during that year. The increase over 1910, to Sept. 1, is therefore 224,123 tons.

Following is the summary by ports:

Port.	August, 1911.	August, 1912.
Escanaba	706,445	761,717
Marquette	357,571	570,586
Ashland	407,578	761,539
Superior	1,689,952	2 397,535
Duluth	1,211,667	1,690,650
Two Harbors	1,175,098	1,578,221
Total	5 548,311	7,760,248
1912 increase		2,211,937

Port.	To Sept. 1, 1911.	To Sept. 1, 1912.
Escanaba	2,418,251	3,240,011
Marquette	1,200,748	2,001,400
Ashland	1,509,841	2,865,397
Superior	6 382,273	9,066,190
Duluth	4.370,117	6,076,452
Two Harbors	3,724,838	5,801,702
Total	19,606,068	29,051,152
1912 increase		9,445,084

Furnace Nearing Completion

Construction work, in the main, upon the new blast furnace of the Northern Iron Co., at Port Henry, N. Y., is now practically completed, and the connecting up of the stack and other finishing touches are now being given to the plant. The new furnace will be a thoroughly modern plant and will have a capacity of 200 to 250 tons of iron daily. It will be blown in around Oct. 1, or early in that month. The furnace replaces the historic Cedar Point stack which was in operation for many years.

INCREASED IMPORTANCE

Of Cuban Ore as Merchant Supply Shown by Next Year Sales.

The opening of the eastern ore market for next year's delivery by a sale of a block of 35,000 tons of El Cuero, Cuban, ore at practically 50 cents advance again directs attention to the increased importance that has been attained during the past year or more by the Cuban deposits as a source of merchant supply for eastern iron makers.

This sale represents about one-fifth the annual offering of ore to eastern merchant furnaces by the miner, the Punupo Manganese Co., with operations at Nima Nima, Cuba, in the Daiquire or south coast district. The block of ore sold is of the second quality El Cuero, or Bessemer analysis ore. It runs about 59 per cent in iron natural, 0.025 in phosphorus, 9.0 in silica, 4.50 in lime and magnesia and 0.05 in sulphur. The first quality El Cuero ore is of low phosphorus grade, which approximates 60 per cent iron natural, 0.009 phosphorus and is free of arsenic.

The El Cuero ore was first offered to eastern merchant furnaces early in the present year for shipment over the first half of the the present year at a price of 7 cents per unit, Philadelphia. For second half the price was raised to 7¼ cents per unit. During the present year, about 180,000 tons, or the full output of the mines, have been sold. The new price of 8 cents per unit is accordingly the highest price that has yet been paid for this ore. Previous to its being offered to eastern merchant furnaces, this ore was absorbed by one of the steel companies operating Cuban mines. Recently, as reported, the Spanish-American Iron Co., the leading Cuban operator and a subsidiary interest of the Pennsylvania Steel Co., has also been selling some merchant ore in the eastern market for this year's delivery on the basis of 7¼ cents per unit, Philadelphia.

The Ohio Knife Co. will build a new factory at Dreman and Follett avenues, Cincinnati, which will cost about $25,000. The company manufactures large machine knives for the wood-working, sheet metal and paper trades. The new plant will consist of three separate buildings, one of which will be 35 x 240 feet, another will be 35 x 340 feet, and the third, which will be a power house, will be about 30 feet square. All will be one story in height and of reinforced steel and brick construction.

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International Iron and Steel Specifications

Sentiment unfavorable to the early adoption of unified specifications by the leading iron and steel producing nations was expressed at the triennial congress of the International Association for Testing Materials, held at New York City last week. The recommendations for the unification of these standards was made by the American Society several years ago, and the late Dr. Charles B. Dudley, at that time president of this organization, fostered the hope that at not a distant date, Russia, Great Britain, Germany, France, the United States, and other countries of lesser importance, would work under the same standard specifications for all iron and steel products.

The international committee which undertook this work was confronted with no small task. The difference in manufacturing practice proved an almost unsurmountable difficulty and the merger of these on a common basis was almost impossible of accomplishment. Commercial supremacy in the iron and steel export markets of the world is the end sought by all of the contending parties, and suspicion that a unified standard might favor one country more than another is the undercurrent of feeling which doubtless has prevailed at all of the conferences that have been held by the committee. That this was generally appreciated was indicated by the action of the sixth congress, which limited the scope of the commission to the gathering and dissemination of data bearing upon international iron and steel specifications with the recommendation that such information be reported to the council from time to time. It was reported that intense feeling, almost approaching bitterness, was in evidence at some of the committee meetings and under such conditions it is apparent that common ground cannot be reached. Germany, France and the United States are more nearly in agreement than is Great Britain with these countries, and it is certain that the British members of the committee will not yield a point that might endanger the command of the world's markets now enjoyed by their nation.

On one of the minor points in controversy, namely the grading of pig iron, Great Britain continues to trail and insists upon judging quality by fracture instead of by chemical analysis. The uncertainties of fracture grading long since have been recognized by the iron and steel manufacturers of other countries, yet the British members of the committee were opposed to the adoption of an analysis standard. At the next congress, which will be held in St. Petersburg, it may be possible to come to agreement on the arbitration test bar for cast iron, as the only difference now existing relates to the length of the bar most satisfactory for testing purposes.

Aside from international specifications for iron and steel, uniform nomenclature for these products aroused the greatest interest. The committee which sought to define these terms has been at work on its report for six years and in view of the different languages of its members and their location in widely remote countries, it was a tremendous undertaking. The two definitions of steel submitted, one official and the other by the British members, sought to include any metal thus defined as steel, "whether it contains much or little or even no carbon, and, for that matter, even if it is chemically pure iron. It is sometimes called 'ingot metal' ". Naturally, these definitions would classify "ingot iron" as steel, notwithstanding its negligible content of carbon. Protests against the steel definition were made by delegates from Russia, Germany and France and by American members of the association. A term analogous to ingot iron is used in Russia to define a mild steel and Germany likewise makes a similar distinction. As it was apparent that the report would not be accepted, the motion for its adoption was withdrawn. Objection also was made by the committee to the use of the term "semi-steel" which was defined as a vague trade name for various products near the border line between steel and cast iron.

Regardless of the position of the committee as to the use of the terms "ingot iron" and "semi-steel" they are being introduced in iron and steel nomenclature in the United States, by trade usage. Mere academic objection will not suffice to prevent the use of these terms to define certain products, and as nomenclature largely records trade usage, some recognition should be accorded these terms instead of making an effort toward their elimination. "Semi-steel", or whatever this metal may be, is being successfully melted in many foundries and is utilized for the production of close-grained castings. Steel, in varying amounts, from 5 to 40 per cent, is employed in the mixtures, and it is not among the impossibilities to define this product on the basis of its carbon content.

Radicalism in Ohio—A Warning to Other States

Half of the voters of Ohio went to the polls Sept. 3. The other half—about 500,000—failed to vote. Doubtless, at the election next November, more than a million voters will cast their ballots, although action upon the 42 constitutional amendments voted upon a week ago last Tuesday was of greater importance to the people of Ohio than the result of the presidential election will be. The above facts conclusively show that it is much more difficult to interest voters in principles than in personalities. This is true to a

surprising extent of intelligent people. It shows the urgent necessity of doing all that possibly can be done to arouse the public when important questions are pending in a referendum. The mind of every reasonable man must be appealed to and sound doctrines must be preached untiringly, if the referendum is to result in anything like an intelligent expression of the views of as many men as usually attend elections when candidates are voted upon.

That the efforts in Ohio during the past few weeks to defeat the adoption of radical measures were a dismal failure is shown in a very impressive manner by the small vote cast and by the adoption of the initiative and referendum, the so-called welfare of employes amendment and other radical departures. In the case of the "welfare" proposition particularly, it seems certain to us that the result would have been different if the voters had been really informed by dispassionate, vigorous and fair discussion. As it was, the opposition to these amendments was feeble. Even such an amendment as that striking the word "white" from the constitution of 1851, in order to make it conform with the constitution of the United States, had stronger opposition as expressed in votes than had amendments which should have been defeated. For example, in Cuyahoga county, in which Cleveland is located, 53,514 voted for the welfare of employes amendment and 7,096 against it, while 17,659 voted to keep "white" in the state constitution. Senseless prejudice against the negro was responsible for more votes than was the thoughtful opposition of well informed and conscientious men to the most dangerous proposition submitted. More men were guilty of the folly of voting to keep "white" in the constitution, although the use of the word is made void by the constitution of the United States, than went to the polls to record their opposition to setting aside the Bill of Rights as proposed in the welfare of employes amendment.

Hopeless ignorance and prejudice, do you say? No, we do not believe the situation is hopeless, but the result in Ohio shows the citizens of that state who still adhere to sound principles that they have a tremendous task before them in influencing legislators to make legislation as sound as possible under the wide discretion offered by some of the amendments. People of other states may well take warning from Ohio and get to work before highly objectionable measures are written into the organic laws of their own states. The great need of the times is a more vigorous opposition to theories that are really dangerous without fighting everything that proposes a change in existing conditions. Not less important is the earnest support of measures which promise to quiet unrest and to establish more nearly just relations among men. One of the most serious blunders of a leading organization of Ohio employers was to send broadcast a pamphlet which in very severe language condemned nearly all of the 42 amendments, going so far even as to urge the rejection of the schedule stating the time that the various changes would become effective. This document, written by Allen Ripley Foote, had a tendency to disgust many fair-minded men and probably did more harm than good. A decided weakness of the opposition was the lack of support of men who were able to meet in the open the countless champions of the initiative and referendum and other amendments. James A. Emery, whose able work for various employers' associations is well known, came into the state at the eleventh hour and made a speech or two, and his was almost the only voice heard in argument against amendments which aimed at rights sacred from time immemorial. Hon. Daniel J. Ryan, of Columbus, contributed a very able, temperate article to the campaign, but it had limited circulation. Contrasted with the few who raised their voices against the radical amendments was an army of speakers, including some of unquestioned oratorical power, advocating the adoption of nearly all the proposed changes. Labor stood in solid phalanx and worked with all its might.

Under such conditions, the result is not surprising. Similar results will follow in other states if the experience of Ohio is not heeded. If, however, men who see dangers in many present-day tendencies will devote more time and thought to the study of political economy, strive unselfishly to arrive at correct conclusions, cultivate the art of public speaking and then appear in the open, fighting for constructive measures to benefit humanity and against destructive propositions—when, in short, there grows up an enlightened, militant citizenship, which depends more upon brains than on money for success, a greater number of intelligent men will go to the polls and their verdict will promote the welfare of all the people.

The Need of Mobile Capital

A summary recently made by the *Journal of Commerce* is to the effect that maturing obligations of railroad and industrial corporations for the two calendar years, 1912 and 1913, reach a grand total of $513,851,100, of which it may be observed a preponderating amount falls due in 1913. A striking feature is that notes constitute the bulk of the maturities, furnishing practically two-thirds of the total.

The maturities are not especially large compared with the maturities of the past few years, which have been successfully met, but the burden is a large one, requiring that there shall be constantly available a very large fund of mobile capital. A feature that is worthy of attention is the large proportion of notes falling due. As the time of a loan is shortened, the possibility of its being a disturbing factor is increased. It may be renewed time after time, but the more frequently the renewals occur the greater the chance is of a maturity falling in a time of financial stress.

For several years, the tendency has been strong to replace long term bonds with short term bonds, and bonds with notes. The practice on a large scale was inaugurated immediately after the panic of 1907, and at first was regarded purely as a temporary expedient. Maturing loans would be taken care of by short term bonds or by notes, to carry the borrowers into a more settled period, when these short term securities were to be replaced by bonds of the old time length. Year by year, the practice has continued, and instead of its reaching its end, as a temporary expedient, it has increased.

Times of financial stress are bound to come, and no long period of years can be free from them. It is now nearly five years since the last, which was a very severe one. The next period of this sort will develop the fact that the introduction of such a large volume of short term securities in the past five years has greatly complicated the situation, and as usual wonder will be expressed that so obvious a fact was not generally recognized before time permitted it to develop into a calamity.

Some Defective Rails and How to Avoid Them[1]

Types of Defects Which Invariably Result in Rail Failures, With Suggestions to Manufacturers for Overcoming the Difficulties

By Robert Job

Under present conditions of railroad traffic in this country it is of especial importance to secure strong, sound and durable rails. The compositions best adapted to the varying requirements have been pretty well determined by the teachings of service. The open-hearth process which permits the use of greater toughness and hardness through low phosphorus and sulphur content, has been widely extended, and the various principles and details of manufacture have been so thoroughly studied that our mills are capable, not merely of large tonnages, but of high excellence in quality.

Variation in Product

It is a well-known fact, however, that decided variations in the product at times occur. Sometimes the large majority of the rails from a rolling give generally good service while only a small percentage are found to contain defects which cause failure in track. In other rollings from the same mills the percentage of defective rails is much higher, although the rails may be used under nearly identical conditions as to track and service. In many instances good rails immediately beside one which failed have been removed from track and carefully studied with the object, not merely of finding out the exact cause of the failure, but also to ascertain the qualities which under the same traffic conditions resulted in good service. This work naturally has been extensive. It may be of interest to show types of various failures which, in a measure, are characteristic, and which have come to our attention under widely differing service conditions in various parts of this country and of Canada, and also to give a brief account of some methods which have been devised with the object of detecting defects which would detract either from safety or from serviceability.

Piped Rail

One of the best known of these defective types is the so-called piped rail, Fig. 1, caused by defective mill practice in failing to crop the blooms to sound steel. A rail of this kind does not generally fracture in track, but mashes down gradually and is detected by the track men and removed before it becomes unsafe.

Another type, Fig. 3, is the split head, and in this illustration the flowing over upon both sides of the head is shown. This section has been polished and lightly etched with iodine, and it will be seen that the metal is thoroughly unsound, again due to failure at the mill to crop the blooms to sound metal. As a result, the steel has too little tenacity to support an ordinary load, and crushes.

In Fig. 2 we look down upon the top of a 100-pound rail, from which a layer, about ⅜ inch thick, has broken out in service. A seam runs lengthwise through the rail, and by carefully observing the fracture it will be noted that the failure began at the seam line and extended gradually in service until the crack reached one side of the head and nearly extended to the other. A failure of this kind is particularly dangerous since it is gradually developing while the rail is in service and no outward indication may be given of the presence of the defect. The rail in question was made by the open-hearth process and had the following composition:

	Per cent.
Manganese	0.82
Sulphur	0.030
Phosphorus	0.025
Carbon	0.77

Defective Mill Practice

The composition was normal and gave no indication as to the cause of failure. Fig. 4 shows an etched section from the same rail taken at the same location, and it will be seen that the steel is thoroughly unsound and porous and shows clearly the spot at the seam line. Another section, Fig. 6, was cut at another part of the same rail and has the same condition of radical unsoundness, and an analysis of the powder which lined the seam showed that it consisted mainly of slag, though also about 1.5 per cent of carbon was present. The exact method of formation of this type is beyond the scope of our present subject, but it is an evident defect in mill practice.

Fig. 5 gives another example of a radically unsound rail with a split lengthwise in two planes. Fig. 7 is a similar type, with a longitudinal seam through the head, and the defective character of the steel is clearly shown in Fig. 8. This condition obviously would have been avoided by proper mill practice.

Internal Transverse Crack

Fig. 9 shows the type of failure known as an internal transverse crack. This is also particularly dangerous since it is not present in the rail when rolled, but begins to develop in service at some point of weakness within the steel, and gradually extends across the head until fracture of the rail occurs. The rail in this case was made by the Bessemer process and had the following composition:

	Per cent.
Carbon	0.67
Phosphorus	0.058
Manganese	0.88
Sulphur	0.041

This rail was removed from track and broken under the drop, and a similar crack, though smaller, is shown in Fig. 10, about three feet from the first, in the lower part of the head, near the web, while about a foot further along the rail a small crack, in embryo, so to speak, was found, Fig. 11. Another failure of this type is shown in Fig. 12, which represents an open-hearth rail of the following composition as compared with its heat analysis:

	Rail analysis, per cent.	Heat analysis, per cent.
Carbon	0.86	0.65
Manganese	0.74	0.81
Phosphorus	0.030	0.024
Sulphur	0.050	0.055

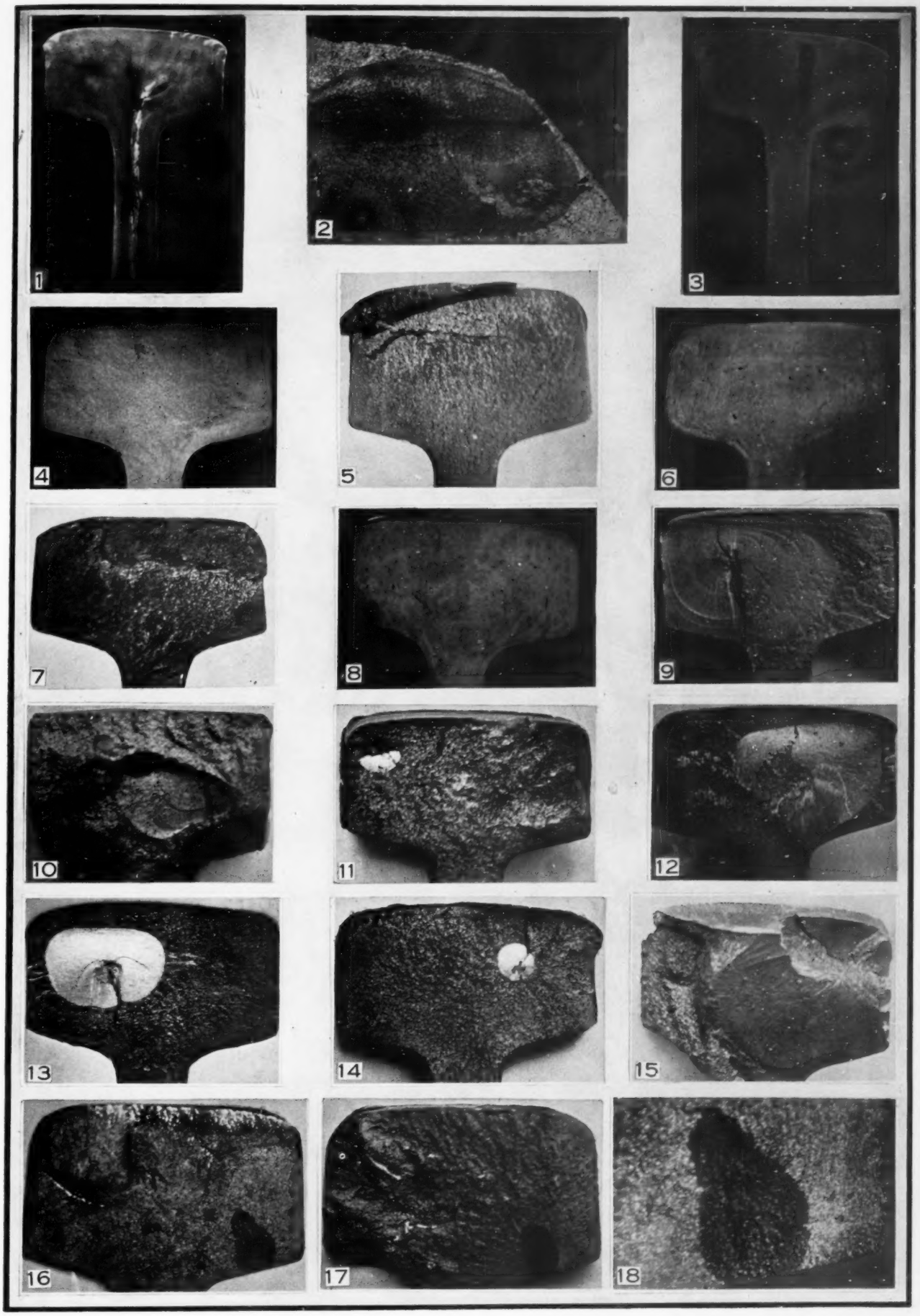
The rail was thus decidedly segregated, indicating defective mill practice.

Spots in Steel Rails

A characteristic form is shown in Fig. 13 and the nucleus of weakness at which the fracture began is clearly seen near the center of the crack. Fig. 14 illustrates again the gradual growth of what later on would have been a failure of this nature and the spot of weakness at the center is evident.

Owing to the dangerous character of this type of failure and the need of definite knowledge as to the prime cause of the growth, we made a critical study of the subject, gathering data throughout the country. The defect was found in low carbon steel and in high carbon steel, in rails as heavy as 100 pounds per yard and as light as 80 pounds,

[1]Presented before the International Congress for Testing Materials.



NUMEROUS TYPES OF DEFECTS FOUND IN STEEL RAILS

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while in some cases where rails as light as 67 pounds were used and subjected to the same wheel pressures none of the defects had developed.

What are Causes of Failure?

As has been previously stated, the defect was found, in relatively small numbers, in both Bessemer and in open-hearth steel, made at different mills scattered over the country and in service in various parts of this continent. Thorough study proved beyond question that the composition of the steel in its ordinary elements was not the cause of the failure, and also that the conditions of service were not the prime cause. Analysis of the small central core in these spots was not conclusive, and microscopic investigation proved that the spots were mere cracks and did not extend longitudinally along the rail. In other words, they had no depth, but on examination of the steel in the immediate vicinity of the central core we always found decided porosity or other source of weakness, this condition being caused by various defects in the mill practice.

In one of these unsound rails, Fig. 15, two internal transverse cracks had developed within about 1 inch of each other.

Another characteristic form of internal transverse crack is shown in Fig. 16, a badly segregated open-hearth rail in which the manganese content was 1.62 per cent, although the heat average approximated 0.80 per cent.

Segregated Open-Hearth Rail

Fig. 18 shows a three-fold enlargement of the spot shown in Fig. 16, and by noting the formation of the ridges it will be apparent that the fracture began inside the head and gradually extended until it reached the surface. The spot was about ¼ inch long. Fig. 17 represents a similar crack in a 110-pound, open-hearth rail, in which the manganese was also excessive, 2.62 per cent being present, whereas the heat average was approximately 0.90 per cent. In both of the latter cases the abnormal composition was caused by failure in manufacture to properly mix the manganese added in the ladle.

The types of various defects might be extended almost indefinitely, but I will limit myself to one other, which has been found to cause difficulty resulting in the so-called moon-shaped fracture. Rails which contained this defect of manufacture were usually seamy throughout the sections.

Our experience has been that defective condition is very seldom characteristic of an entire rolling, but that it is generally present only in individual ingots. Consequently it was clear that in order to guard most effectively against the various defects and at the same time to utilize the largest possible proportion of the rolling, it was desirable to test each ingot in the rolling, stamping each rail with its ingot number, in addition to the heat number and the letter indicating its position in the ingot. Also, in order to forestall as far as possible the various defects in the rails, we found it advantageous to place a considerable number of inspectors throughout the mills in order to watch the progress of the manufacture in its various details and to report all variations which would tend to lessen the value of the product. The plan has been in operation for about one year with very satisfactory results.

These extraordinary, though now needful precautions on the part of a railroad company should be unnecessary since they are intimately connected with the manufacture of the steel and should properly be observed by the mill itself to safeguard the quality of its own product.

Drop Test

Of the routine tests we have found it advisable to make a drop test upon a butt from each ingot in the heat in order to avoid brittleness, and make this our regular practice, rejecting all rails from each ingot which fail under the test. The ductility test of Dr. P. H. Dudley has also been found extremely useful in helping to avoid qualities which result in some of the types of failures shown. The test to destruction under the drop to detect piping is also of great value, and serves a check upon the work of the men at the shears and tends to reduce to a minimum the number of piped rails in any given shipment, particularly when the tests are made upon the ingot plan mentioned. The deflection measurement under the drop test enables one to avoid undue softness, while base seams may be detected, if present, by making the drop test with the head of the rail downward, as is our regular practice, but with the base slightly inclined so that the drop will strike the extreme side of the base and thus open up, as a result of the blow, any unwelded seams which may be present. If seams are found the top rail of the ingot might properly be rejected. This modification does not interfere with the effectiveness of the drop test in other respects.

Quality, Not Quantity

I have tried to outline some important causes of failure of rails under present conditions of service, and to mention briefly various methods which have been devised and developed, from time to time, in the effort to detect unsafe or unserviceable material in the product offered by the mills. An immense amount of work has been done in this connection and has been necessary in view of the conditions which have been encountered. I wish, however, to emphasize with all the force of which I am capable, the absolute unfairness of the forcing upon the railroads of this country the detecting of defects which if the rails were properly made would seldom be present in the steel. I believe also that I am not amiss in stating that it is today the earnest wish of every one who has at heart both the interests of our railroads, with safety and economy of traffic, and also the integrity and development of our manufactures, that the day may not be distant when every artisan in our mills, from the highest to the lowest, through the recompense received in return for his work, shall be made to realize, not that quantity of production is the main goal toward which his energies should be directed, but that quality is the prime requisite, and my faith in the efficiency and capacity of our mills is so great as to be convincing that under such a system the mills would become noted in greater measure than ever before, both for the extent of production and equally so for the excellence of the product.

Foundrymen's Associations Meet

The regular monthly meeting of the Pittsburgh Foundrymen's Association was held at the Fort Pitt hotel, Monday night, Sept. 9. Dinner was served at 7 o'clock, after which Dr. Richard Moldenke, secretary of the American Foundrymen's Association, spoke about the convention to be held at Buffalo, Sept. 24, 25 and 26. He also spoke about the exhibition of foundry supplies and equipment.

W. O. Renkin, supervising engineer, Tata Iron Works, Sakchi, Bengal, India, talked about the erection of the Tata works, and told of the various developments from the time of the clearing away of the jungle to the installation of plant equipment. All of this work was done by the native Indians, and Mr. Renkin described some of the customs of the various castes and tribes, illustrating his talk with a number of interesting photographs.

A. W. Moyer, of the Rockwell Furnace Co., 26 Cortlandt St., New York, was the principal speaker at the first fall meeting of the Philadelphia Foundrymen's Association, held at the Hotel Walton, in that city, last week. Mr. Moyer presented a paper on "Ovens for Baking Cores, Mold Drying and Annealing Steel Castings." The lecture was illustrated by lantern slides showing oven construction and similar foundry appurtenances.

MEN OF THE IRON TRADE

R. L. Parish, president of the Oriskany Ore & Iron Corporation, Lynchburg, Va., has returned from a two months' tour of the British Isles and continental Europe.

W. D. Matthews, Toronto, Can., has been elected vice president of the Canadian General Electric Co. The vacancy on the board of directors of the company, caused by the death of H. P. Dwight, has been filled by the appointment of F. Gordon Oster, Toronto, to that position.

C. H. Sternberger, brother of the late M. L. Sternberger, has been elected a director of the Wellston Steel & Iron Co., Wellston, O., succeeding Eugene Zimmerman. This concern will blow in its second stack within a few days and is putting its Milton stack in shape for operation.

John Helmer was elected president of the Cuyuna-Duluth Iron Co., Duluth, Minn., at the recent annual meeting of the board of directors. Other officers chosen were first vice president, Otto J. Wendlandt; second vice president, C. B. Rowley; secretary, E. J. W. Donahue; treasurer, W. H. Locker.

President Charles S. Price, of the Cambria Steel Co., Johnstown, Pa., is said to be slowly recovering from the ill health, brought on by overwork. His complete recovery is expected. Mr. Price quietly observed his sixtieth birthday anniversary at his home in Johnstown, a few days ago. He entered the employ of the Cambria Iron Co. in 1876.

E. M. Peters, president of the Miami Iron & Steel Co., Hamilton, O., was elected president of the Hamilton Otto Coke Co., Hamilton, at a recent meeting of the board of directors. The stockholders of the company chose the following board of directors: J. C. Thomas, F. L. Perin, H. L. Brenneman, F. L. Garrison, E. M. Peters, W. E. Hutton and Robert Ramsey. J. C. Thoms was elected vice president and E. C. Seemers, secretary and treasurer. Mr. Seemers is also secretary and treasurer of the Miami Iron & Steel Co.

M. G. Moore, former superintendent of the mining department of the Cambria Steel Co., has been appointed mining engineer. James W. Cook, former assistant superintendent in the mining department, has been appointed superintendent, and James A. Stoker has been named Mr. Cook's assistant. R. C. Bateman has been appointed superintendent of the coke plant.

W. W. Wolff, who has been manager of the Jenkins Machine Co., Sheboygan, Wis., for 15 years, has purchased the interest of Thomas A. Long and Miss M. A. Long in that company. The business of the company will be extended. The newly-elected officers are: President and manager, W. W. Wolff; vice president, Louis Wolff; secretary, Mrs. Alice Wolff.

F. F. Fitzpatrick, president of the Railway Steel Spring Co., New York, has just returned from a 10-day tour of inspection of the different plants of the company. All of the works are being operated at capacity. "Labor conditions I find are improving," said Mr. Fitzpatrick, on his return. "Wherever I went, I found optimistic spirit, with politics making not the slightest difference."

W. J. Olcott, president of the Oliver Iron Mining Co., was head of a party that escorted members of the American Geological Society on an inspection trip through the Mahoning, Hull-Rust and Burt-Sellers mines last week. There were 42 delegates from 16 European countries and 25 American geologists in the party. The mines inspected are three of the largest on the Mesabi range.

H. B. Kelly, Waterloo, Ia., was elected president of the National Association of Steel Tank Manufacturers, at the recent annual meeting in Waterloo. Other officers chosen at the meeting were first vice president, A. N. Eaton, Omaha, Neb.; second vice president, C. S. Riggin, Bradley, Ill.; third vice president, E. W. Kerrihard, Red Oak, Ia.; secretary and treasurer, F. A. Rufi, Kansas City, Mo.

R. F. Pack, general manager of the Toronto Electric Light Co., has resigned his position. It is understood that he has secured an appointment in connection with a large electrical development enterprise. He had been with the Toronto Electric Light Co., for 21 years, and is president of the Canadian Electrical Association and a member of the executive committee of the National Electric Light Association.

A. H. Perdue, of the Tennessee state geological survey, has returned from a trip to Wayne county, that state, where he examined the geology and iron ores. A topographic map was made in 1902 of this region by the United States geological survey, but the geology has never been worked out.

Samuel H. Whitaker, who for some time has been assistant managing director of the Dayton Coal & Iron Co., Dayton, Tenn., with offices in Cincinnati, has been promoted to the vice presidency of that company. Mr. Whitaker is one of the best known men in iron and steel circles throughout that section of the country, and has been with the Dayton Coal & Iron Co. for 27 years. He will assume his new duties at once, and will retain his office in Cincinnati.

President Charles M. Schwab, of the Bethlehem Steel Co., South Bethlehem, Pa., sailed last week for Europe. He will remain abroad until some time next month. He was accompanied by several engineers of the company, who will take charge of work to be done in Germany, Italy, Greece and Sweden. In an interview before leaving, Mr. Schwab expressed himself as well pleased with conditions in the steel business. "We could not hope for better steel conditions than now prevail," he said, "and there is every indication that the prosperity we are now enjoying will be permanent. The Bethlehem Steel Corporation's plants are operating full. As a matter of fact, there is very little capacity available for additional new business up to the first of next year. Steel orders have been running in excess of production, and new business continues to come in at a gratifying rate. It looks as though the activity the steel companies are now enjoying will continue into next year. Of course, it is always unsafe to make predictions too far ahead, but the excellent crop outlook and business activities in general forecast continued stable conditions for many months to come. In the current year, production of iron and steel will establish a new high record.

OBITUARIES

George W. McClure, well-known resident of Pittsburgh and founder of the firm of G. W. McClure, Son & Co., engineers and contractors, died at his home, 1223 South Negley avenue, Sept. 4. He was born in Pittsburgh, Sept. 13, 1836, and his boyhood days were spent in company with Andrew Carnegie and other prominent manufacturers of iron and steel. Mr. McClure received his early education in the public schools of Pittsburgh and when 22 years old became a contractor. His first work in the blast furnace line was with the firm of Lyons & Schaub, in the Allegheny mountains. This firm at that time was also operating the Sligo plant in Pittsburgh. Later he built blast furnaces for John H. Schoenberger and James Wood, pioneers in the iron industry.

Mr. McClure kept himself informed on all improvements pertaining to the manufacture of iron and steel, and was instrumental in bringing into use a number of changes in blast furnace construction which are now being used all over this and other countries. He had extensive experience with the different methods of heating air for blast furnace practice from the old system of cast iron pipe hot blast stoves down to the present method of heating air through fire brick hot blast stoves. In 1883, Mr. McClure formed a partnership with A. Schuler, and the death of the latter caused the firm of McClure & Amsler to be formed in 1888. Upon the death of Mr. Amsler, in 1894, James W. McClure, a son, was taken into partnership, and in 1899, Joseph B. Pearson, who, for many years was connected with the office, became a member.

GEO. W. McCLURE,
Pioneer Blast Furnace Builder Who Died Sept. 4.

Charles H. Spencer, for a number of years general agent of the H. C. Frick Coke Co., Pittsburgh, died about a week ago at Monmouth Memorial Hospital, Long Branch, N. J. He was buried from his late residence in Pittsburgh. Mr. Spencer retired from the Frick company several years ago.

Walter A. Crandall, treasurer and general manager of the Rhode Island Tool Co. for the last 15 years, died Sept. 6 at his home in Providence, R. I., of heart trouble. He was 63 years old, and had been identified with the Rhode Island company for 47 years. He was born in Royalton, Mass., Jan. 3, 1849. He entered the employ of the tool company immediately after leaving school, the concern, at that time, being known as the Providence Tool Co. The name was changed in 1833. Mr. Crandall was elected treasurer and general manager in 1897.

Harold G. Willson, well known in iron and steel circles in Ohio and Michigan, died recently at Detroit, aged 31 years. He was born at Seaforth, Ont., Canada, in 1881, and became identified with iron and steel interests 20 years later, after completing his education. For eight years, he was associated with the Detroit office of the Crucible Steel Co. of America, Pittsburgh. Later he became connected in an official way with the Pittsburgh Shafting Co., Detroit, and was elected secretary and manager of that company in August, 1911. Mr. Willson is survived by his widow.

FOR CONDUIT WORKS

Youngstown Sheet & Tube Co. Buys Struthers Mill.

The Youngstown Sheet & Tube Co., Youngstown, O., has purchased the Struthers, O., works of the American Sheet & Tin Plate Co., as was announced Friday in The Daily Iron Trade Review. The Struthers plant, which has been idle several years, is adjacent to the rod and wire department of the Sheet & Tube company.

The Struthers works include an old mill, 100 x 250 feet, to which an addition, 50 x 80 feet will be erected; a new mill, 125 x 425 feet, which will be used as a warehouse; a warehouse, 175 x 50 feet; a machine shop, 40 x 75 feet, an office building, blacksmith shop and several smaller buildings. The plant is located along the Pennsylvania and the Pittsburgh & Lake Erie railroads, affording good shipping facilities.

With the exception of the new mill, which will be used as a warehouse, as has been stated, all the buildings will be used for the manufacture of conduit pipe, under the control of a subsidiary known as the Western Conduit & Mfg. Co., which will enable the company to considerably increase its capacity in this department. The sheet furnaces, annealing furnaces, sheet mills and equipment, which have stood idle ever since the strike several years ago, will be torn down. The contract for the steel structural work already has been let, to the Brown Hoisting Machinery Co., Cleveland, and it is announced that the plant will be in operation Jan. 1, of next year. Approximately 100 men will be employed in the new works.

Lake Erie Ore Receipts

Out of total ore shipments of 7,760,248 tons during August, Lake Erie ports received 6,075,673 tons, distributed as follows:

Port.	Gross tons.
Buffalo	802,367
Erie	62,274
Conneaut	1,303,982
Ashtabula	1,305,840
Fairport	375,373
Cleveland	1,291,831
Lorain	637,388
Huron	78,100
Sandusky	.....
Toledo	141,145
Detroit	77,373
Total	6,075,673

POOR YEAR

For American Locomotive Earnings—Bookings Much Heavier.

The annual report of the American Locomotive Co. for the fiscal year ended June 30, 1912, shows a reduction in gross earnings of $10,199,933 and in net earnings of $1,790,965. There was carried to surplus but $117,554 compared with $1,515,562 the preceding year.

The income account for the year compares as follows:

	1912.	1911.
Gross	$30,449,451	$40,649,385
*Expenses	28,117,547	36,526,515
Net	$2,331,904	$4,122,870
Charges, etc.	464,350	557,308
Surplus	$1,867,554	$3,565,562
Preferred dividends	1,750,000	1,750,000
Surplus	$117,554	$1,815,562
Add. and betterments		300,000
Surplus	$117,554	$1,515,562

*Manufacturing, maintenance and administrative expenses and depreciation. Depreciation charge for 1912 was $1,021,382, as against $1,056,417 for 1911.

Commenting upon the year's business, President W. H. Marshall says:

"The volume of sales for the first half of the fiscal year was at a low ebb, and was equivalent to only 33 per cent of the amount of business necessary to keep the plants running at full capacity. Since Jan. 1, 1912, there has been a much stronger demand for new locomotives with the gratifying result that the amount of unfilled orders on the books on July 1, 1912, was $14,450,000, as compared with $6,015,000 at the beginning of the year. Apart from the loss of profits due to the natural decrease in business, the company suffered serious financial loss as a result of the strike of its boilermakers which affected practically all of its plants and lasted from October, 1911, to February, 1912. During this period production was badly retarded and at times the plants were practically at a standstill.

"Any disagreement with our employes is to be regretted, but an issue was forced upon the company which had to be met without compromise, regardless of the fact that such a disagreement, with its attendant expense and arrest of output, might greatly reduce the net earnings for the year. Our employes individually and collectively expressed themselves as entirely satisfied with their relations with the company. Solely out of sympathy with the boilermakers of a railroad system who were out on a strike, our boilermakers insisted that this company should not perform its contracts with the railroad until the railroad had adjusted its differences with its own boilermakers. This company could not, as a matter of principle, submit to such a demand, and stood firm in its position until our workmen receded from the attitude they had taken."

TAXATION OF ORE

In Transit Again Discussed by Ohio Auditors.

The taxing officials at Lake Erie ports met in the office of the Cuyahoga county board of review, at Cleveland, Sept. 5, to ratify the action taken by the taxing officials on Aug. 6, when a valuation of 40 cents per ton was placed on all ore remaining on Lake Erie docks. J. H. Shaffrank, president of the board of review, Cleveland, opposed the valuation of 40 cents on the ground that the members were violating their oath of office in accepting any valuation lower than 100 per cent. Four of the taxing officials present voted to sustain the original valuation of 40 cents and the matter now goes to the state board for final action. There were present at the meeting Attorney R. F. Grant, general counsel for M. A. Hanna & Co., H. H. McKeehan, representing Pickan d s, Mather & Co. and the Cleveland-Cliffs Iron Co., W. C. Boyle, representing the Pittsburgh Steamship Co., W. W. White, representing the Shenango Furnace Co. and Oglebay, Norton & Co., and Frank Masten, representing Corrigan, McKinney & Co. The taxing officials present were Otto Haserodt, auditor Lorain county; C. O. Smith, board of review, Ashtabula; W. W. Grant, board of review, Conneaut; W. A. Davis, auditor Lake county; John Deist, auditor Erie county; W. F. Malone, board of review, Lucas county; and J. H. Shaffrank, board of review, Cleveland.

Plan Locomotive Works

The Wabash railroad is said to have completed plans for a proposed locomotive plant at Decatur, Ill. It is expected that $500,000 will be expended on the improvement this year and that the total will reach $750,000. The company will expend $400,000 for terminal yards, car shops and freight houses at Detroit.

Members of the Cincinnati branch of the Metal Trades Association will participate in an automobile ride to the Laughery Club, at Aurora, Ind., on Sept. 14, at which place a banquet will be served.

SOO PLANT

Pleases English Capitalists — May Make Improvements.

Toronto, Sept. 3.—The party of British capitalists who are making a tour of inspection through Canada under the direction of A. M. Grenfell, chairman of the Canadian agency, stopped at Sault Ste. Marie, where they visited the plants of the Lake Superior Corporation, in which some of them are heavily interested. In the course of an interview, Mr. Grenfell stated that in the last three years British capital to the amount of $25,000,000 had been invested in the Lake Superior Corporation, and that it had the strongest financial backing in England, the investors being prepared to find money for any further extension required by the management. They aimed to make these industries the greatest in Canada before they were through. He regarded the Sault as the finest strategic position for manufacturing and the best distributing center on the continent, and intimated that several further improvements to the plant were under consideration. Mr. Grenfell denied the report that the last bond issue of the Algoma Steel Corporation was largely bought up by the United States Steel Corporation, and claimed that London capitalists were gradually taking over the holdings of the Philadelphia interests.

Arthur W. Humber & Co. have secured a two-acre site in North Transcona, Man., for the erection of a plant for the production of cast iron specialties, including a patent heater for houses.

Clean Producer Gas for Glass Furnaces

The recent contract of the Pittsburgh Plate Glass Co. for gas producer equipment marks a noteworthy advance in the gas-making art, in that the installation is guaranteed to operate continuously for periods of at least two months without even a temporary shut-down for flue cleaning. The contract covers three Chapman rotary gas producers complete with flue connections, and was awarded to the Chapman Engineering Co., Mt. Vernon, O. This new type of gas producer is mechanically operated throughout, and seems to be successfully solving the problems of the mechanical production of a substitute for natural gas.

IMPORTANT CHANGES

Made in Constitution of Ohio.—Radical Measures Adopted.

At a special election held in Ohio, Tuesday, Sept. 3, when 42 proposed amendments to the constitution of the state were voted upon, the total vote amounted to about 500,000, compared with 1,136,525 votes cast in 1908, and 932,262 cast in 1910. The majority in favor of the initiative and referendum was about 60,000. The amendments relating to the welfare of employes and primary elections were approved by nearly 100,000. Other amendments approved were:

To remove the limit of the amount of damages recoverable by civil action for death caused in a wrongful act or fault of another.

Providing compensations to workmen and their dependents for deaths, injuries, or occupational diseases by authorizing the legislature to pass laws establishing a state fund to be created by compulsory contributions by employers.

Providing for the regulation of methods of mining, weighing, measuring and marketing coal, oil, gas and all other minerals.

Making eight hours a day's work on public work for the state.

Abolishing prison contract labor.

Providing that laws may be passed for the regulation of insurance rates. Provided that laws shall be passed providing for the taxation of state and municipal bonds, inheritance incomes, franchises and production of minerals.

Providing that corporations may be classified and may be regulated by commissions as to their organization, business and issue and sale of stocks.

Providing double liability of bank stockholders and inspection of private banks.

Providing for license for the liquor traffic.

Providing for municipal home rule.

Amendments to confer suffrage upon women, and to abolish capital punishment, were defeated.

Official returns have not been received from all counties and there is reason for hoping that the complete vote will show that the amendment relating to contempt proceedings will be defeated by the rural counties.

In Promotion Stage.—The California Industrial Co., Los Angeles, Cal., which has operated a small iron plant for several years, contemplates the erection of a steel plant on land which it has purchased. S. I. Merrill is the general manager. The new project is still in the promotion stage. Mr. Merrill states he is waiting to hear from eastern financial interests.

TARIFF REFORM

Must Come, Says Drummond, Before Improvements Are Made.

Toronto, Sept. 9.—After the meeting of the directors of the Lake Superior Corporation at Sault Ste. Marie, Ont., Sept. 4, President T. J. Drummond stated that, while the company had under consideration further extensions of the iron and steel plant, it had been decided to postpone action pending the possible changes in the Canadian tariff. The existing tariff is so torn up by special dispensations, exemptions and rebates, that the progress of the industry is retarded. The manufacture of small lines, giving a small tonnage, was encouraged, while that of heavier goods was discouraged. Certain industries were practically bonused to purchase their pig iron, merchant steel and other raw material abroad. If the industry is to flourish, the tariff must be overhauled, especially in connection with pig iron, merchant mill products, and structural steel. At present, practically 1,000,000 tons of iron and steel which should be made in Canada, were annually imported. The company had placed its case before the government during the last session, and hoped that something would be done, but pending such legislation the company could only mark time.

Tin Plate Celebration

The Merchants and Manufacturers' Club of Elwood, Ind., has issued invitations for the 20th anniversary of the opening of the first tin plate plant in that city on Friday, Sept. 13. Today the club entertains in honor of its first anniversary, and the two events will be marked jointly, distinguished guests being present for both. Among those who are to attend will be Daniel G. Reid and Rudolph Leeds. Parades, addresses, free attractions, band concerts and fireworks are included in the program of gaiety. Addresses on "tin plate day" will be delivered by Gov. Thos. R. Marshall and former Vice President Chas. W. Fairbanks.

The Hamilton Machinery Co., of Hamilton, Ont., has made an assignment to C. L. Moore and George F. Webb.

BRITISH IRON TRADE

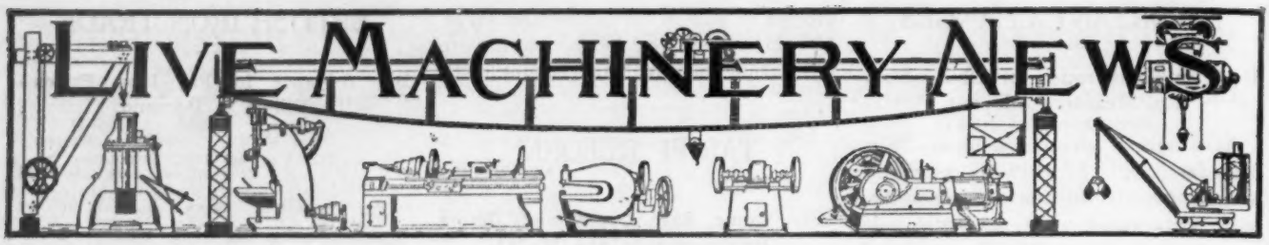
Big Advance in Pig Iron Prices—Billets in Demand.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Aug. 31.

An excellent week has been enjoyed by the pig iron trade. While a few weeks ago Cleveland makers expected selling prices would touch 60s before the end of the year, yet yesterday's figure at Middlesbrough was 63s 8d ($15.58) with 64s 1d ($15.68) one month and 64s 5d ($15.76) three months. Other districts fairly matched this advance. In Cleveland many ships were forced to leave with short cargoes, preferring to do so to waiting to complete consignments. This has resulted in a marked ocean freight rate advance, and further advances are looked for. Stocks are steadily reduced, the amount in store now being 289,000 tons. The cheerful effect of Thursday's Iron Trade Review cable, announcing tremendous pig iron sales, was regarded as very significant. Shortages of pig iron on the continent lead to expectations of big business next month. Everything points to greater cost of labor in the immediate future as skilled labor is scarce owing to emigration, etc. Imports of Swedish iron in fair quantities are helping out some Sheffield foundries.

While the usual thing is for the finished iron and steel trades to receive a fill-up at this season, yet this year the stimulus is greater than ever. Many of the largest Sheffield works, which doubled their capacity in the past 10 years, are unable to meet the demand, while rolling mills and forges in all directions are congested. Vickers, Ltd., are booked in their armament department for three years, John Brown & Co. and Thomas Firth & Sons are similarly situated, while railway steel makers are assured work for a year and even a year and a half ahead. Buyers of small lots of billets, slabs and blooms are compelled to pay fancy prices. In the absence of Belgian billets, British makers are placed in strong position. Firm prices are reported in the tin plate trade, practically all works being fully committed for the next few months.

While its labor needs have been relieved somewhat, the Ralston Steel Car Co., Columbus, O., is yet unable to operate at capacity for lack of sufficient men. About 25 cars are being turned out daily. With enough employes, this number would be increased to between 35 and 40.



In New York, the leading event of the week was the appearance of another large list of machinery specifications, for the General Electric Co., Schenectady, N. Y. This contains 86 tools and has a total approximate value of from $50,000 to $60,000. The list calls for radial drills, vertical upright drills with tapping attachment, several sizes of sensitive drills, multiple spindle sensitive drills, one planer, vertical and horizontal milling machines, a cutter grinder, screw machines, brass universal turret lathes, cutting off machines, etc. This is the second large list to be issued by the General Electric Co. within the last two weeks. Demand in the New York market is especially good for the larger tools, but is only fair for small tools. On the whole, however, the past week has been a very satisfactory one and reflects the improvement which has been constantly manifested since the first of the year. Dealers report that they have considerable difficulty in securing quick delivery on orders, a large number of manufacturers being booked with orders for months ahead. A portion of the Baron de Hirsch trade school list has been closed during the past week. The Baldwin Locomotive Works has also been making some large purchases this week. A small portion of the long-expected Baltimore & Ohio railroad list has appeared in New York and the remainder is expected to be submitted very shortly.

In Pittsburgh, the satisfactory conditions which characterized the machine tool trade in August are continuing, and it is believed that September business will be fully as good if not better than the preceding month. Demand for rolling mill equipment continues rather heavy, although no especially large orders have been placed. Foundries, too, are buying additional equipment or replacing old machines, and single orders from this particular source have been heavy in the aggregate. Last bids on the list of the Pennsylvania railroad have gone in, and awards are expected to be announced within another week.

In Chicago, the machinery business continues to show improvement, although there have been no special developments of interest recently. A number of far western railroads, including the Northern Pacific and Oregon & Washington Railroad & Navigation Co., are actively considering their machine tool requirements.

In Cleveland, the machine tool business is generally satisfactory. The large volume of orders in evidence during the latter half of July and throughout August has continued into September. One Cleveland manufacturer has put out a tentative inquiry for 26 machine tools, but there is little prospect of the business being closed until the first of the year. The railroads are buying in small lots and dealers in northern Ohio are not expecting much business of this class to develop in orders before January. Prices are being well maintained.

In Cincinnati, the machine tool business for the month of August was generally reported to have been less than during July. With some plants it was probably even a little better, but the majority report a slight decrease with the outlook for September not so encouraging.. One feature of the market is that domestic business has improved considerably. Only a few months ago, most of the orders were for foreign shipment, and while they are still much in evidence, domestic consumption has improved in greater proportion. Railroads seem to be the largest buyers of machine tools at present, but they are closing rather secretly and in small lots at a time. Second hand machinery is not selling as well as dealers had expected, and unless it is sold more freely during the remainder of the year, this will have been a rather poor season for this line. Electrical equipment continues in good demand and the local plants at present are rather comfortably supplied with orders.

Power Plant Equipment

We are advised by the Piasa Light & Power Co., 505 Commercial building, Alton, Ill., that this concern expects to build a 2,000-kilowatt electric light plant at Alton, for which considerable new equipment will be required.

The citizens of Humboldt, Sask., have adopted a bylaw for the construction of an electric light plant at a cost of $30,000. The system will be installed immediately. Tungsten standards will be used for the street lighting.

The board of hospital commissioners, of the city of Cincinnati, will receive bids until Oct. 8, for the following equipment for the new Central hospital, now being erected in that city: Laundry machinery; refrigerating plant; water tube boilers and stokers; steam engines; generators and switchboard.

Water Works

The city of Greeneville, Tenn., is preparing to purchase machinery for the improvement of its water works. It recently issued $65,000 of bonds for this purpose.

Plans have been perfected for improvements to the water system of Chicago, which will add 450,000,000 gallons daily to the present supply. The improvements will cost approximately $10,000,000, and will include two new pumping stations. The first new station is planned for Kedzie avenue and Thirty-fifth street, convenient to the stock yards district, with a 14-foot tunnel running under Thirty-fifth street, out 2½ miles into the lake. This plant will be provided with boilers and pumping equipment with a capacity of 100,000,000 gallons daily. The second new station is planned to increase the water supply on the northwest side, and will probably be located at Bryn Mawr avenue, near Forty-sixth avenue. It will be similar in general arrangement to the Kedzie avenue station, and will be of equal capacity. Also four new centrifugal pumps with

an aggregate capacity of 100,000,000 gallons daily will be added to existing stations.

Machine Tools

The American Zinc Co. is in the market for machinery to be installed in its mill at Mascot, Tenn. Work has begun on the mill which will have a capacity of 750 tons a day.

The Central Automobile Co., Newport, Ky., is equipping a large repair shop. A considerable number of machine tools will be needed. Walter P. Dickerson is general manager of the company.

The Jersey City Technical and Industrial high school, Jersey City, N. J., is preparing a supplementary list of grinding and high-speed drilling machine specifications. Inquiries will be sent out at the same time for a quantity of foundry equipment.

The Acme Road Machinery Co., Frankfort, N. Y., advises that it has already purchased a part of the machinery it will require and expects to build the remainder in its own shops, with the possible exception of a 72 x 72 x 12 foot bed extra heavy iron planer.

New Construction

Fred R. Schaefer, 1005 S. La Fayette street, South Bend, Ind., is having plans prepared for the construction of a new machine shop.

The Noelke-Richards Iron Works, Indianapolis, will build a foundry at its plant on Michigan street and King avenue.

The Illinois Malleable Iron Co. expects to build a one-story addition to its plant at 2856 Paulina street, Chicago. The new structure will be 75 x 125 feet.

The Concrete Steel Co., Youngstown, O., is planning to erect a new shop, 80 x 375 feet, in that city. The company is engaged in the shaping and fabrication of steel bars for concrete work.

A new building for finishing iron posts has been completed at the plant of the Sweet's Steel Co., Williamsport, Pa. Several small structures are being erected on the grounds.

Otto Haug & Son, Great Bend, Kan., have made arrangements for the erection of a building, 50 x 100 feet, for a new machine shop at Manchester, Ia. It will be constructed of cement blocks and will have a steel roof.

The Concrete Steel Co., Youngstown, O., is planning to erect a new shop, 80 x 375 feet, of steel, stone and concrete construction. When the shop is completed, it is said, employment will be afforded to from 300 to 400 additional men.

Plans are being prepared for a new machine shop building to be erected at Springrove and Queen City avenues, Cincinnati, for Frederick Holtz. Architect G. W. Drach, Cincinnati, is in charge of the construction of the building.

The Wilson & Bennett Mfg. Co., Chicago, has purchased a four-acre tract of land at Fifty-eighth avenue and Sixty-fifth street, where it expects to erect a plant, costing $40,000, for the manufacture of oil tanks. The new plant will have a floor space of 40,000 square feet and a large amount of new machinery will be required.

The Northern Bolt & Screw Co., Ltd., Owen Sound, Can., is erecting two buildings, one 50 x 640 feet, and the other 82 x 470 feet, with suitable power plant. The company will manufacture bolts, nuts, screws, nails and wire. The company has ordered the greater part of its machinery and equipment, planning to begin operating some time this fall.

The J. I. Case Threshing Machine Co., of Racine, Wis., is making excellent progress in the construction of its large foundry at Lakeside, Racine. The plant will cost approximately $1,000,000 and is being erected by the Westinghouse-Church-Kerr Co. of New York. It is reported that the completion of the foundry will see the re-entrance of the Case company into the general farm implement field.

Work is to begin at once on the erection of an addition to the foundry plant of S. A. Loose & Son, of the Hamburg Plow Works, Hamburg, Pa. Its dimensions will be 30 x 42, three stories. It will be fitted on the first floor for a churn room and the upper floors will contain the wood working departments, which will be removed from their present location. The new building will be of brick and concrete construction, with iron girders.

The South Fork Foundry Co., Johnstown, Pa., is planning extensive improvements and the enlargement of its works at South Fork, Pa. It is in the market for considerable equipment. Contracts for the electrification of the entire plant have been let. Individual motors will be installed for the operation of all machinery, and power will be supplied by an outside power interest. Motor trucks will be manufactured as soon as equipment has been installed.

The Belcher & Taylor Agricultural Tool Co., Chicopee Falls, Mass., advises that the recent fire at its plant completely destroyed its foundry, but none of the other buildings was damaged. The company is now erecting a building of steel construction, 50 x 160 feet, which, it is expected, will be completed in three or four weeks. In the meantime the company is molding in temporary quarters arranged for that purpose. The loss probably will not inconvenience the works to any great extent. The remainder of the plant is running full time and the company is filling all orders promptly.

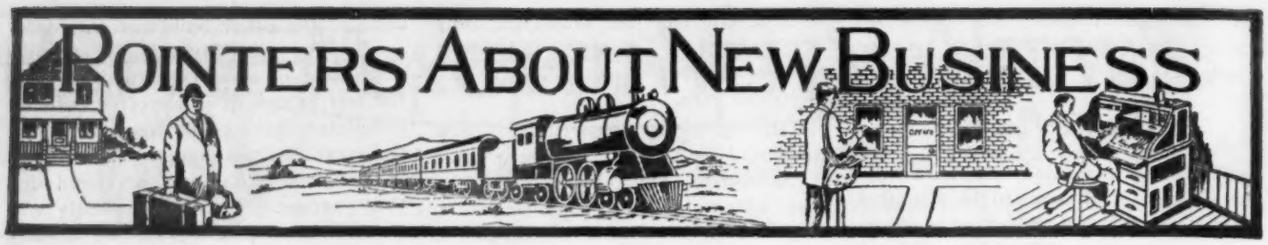
The Forest City Engineering Co., Superior building, Cleveland, has prepared plans and specifications for large additions to the plant of the Superior Foundry Co., Cleveland. The general contracts have been let to the Fath Construction Co., Cleveland, and the structural steel was awarded to the McMyler-Interstate Co., Bedford, O. The plans call for a foundry addition of 90 x 350 feet, containing the foundry proper, cupola and blower rooms, a fireproof pattern storage and machine shop, 60 x 131 feet. The foundry will be of brick, steel superstructure. The foundry will be modern in every respect, with ample floor space for large floor work and sufficient cupola capacity. The pattern storage and machine shop building will have a steel superstructure, while the floor in the pattern storage is to be reinforced concrete and the floor of the machine shop will be a mill floor. This building will be three stories, and as nearly fireproof as possible.

Miscellaneous

The Duncannon Iron & Steel Co., Duncannon, Pa., recently put its 12-inch mill and puddling department on double turn.

The Laidlaw - Dunn - Gordon Co., Cincinnati, has secured the contract for the installation of a 1,500,000-gallon pumping engine of 250 horsepower for the village of Wyoming, a suburb of that city.

The Pennsylvania railroad system has practically concluded negotiations for the purchase of three blocks of land on the east side of Canal street, from Twelfth street extending southward to Fifteenth street, Chicago. This property is now occupied by several of the large foundries of the Crane Co. It will be used by the railroad in connection with the development of its plans for a new passenger terminal at Chicago. It will be necessary for the Crane Co. to remove its plants and it is understood that new shops will be erected at some outlying point. Definite plans have not yet been formulated.



New Buyers

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

The following manufacturing companies have filed articles of incorporation:

The Brazil Can Co., Brazil, Ind.; $50,000; cans; by J. G. Klinger, J. H. McClelland and N. M. Mendenhall.

The Norman Park Can Co., Norman Park, Ga.; $10,000; to manufacture tin cans; by R. L. Norman, J. P. Byrd and V. F. Norman.

Regle Brass Co., Marysville, O.; $75,000; by J. B. Couture, Walter M. Otto, Charles Braun, P. W. Galloway, W. P. O'Brien.

Salisbury Ball Bearing Mfg. Co., Wilmington, Del.; $100,000; by H. Ralph Ewart, R. Boyd Cooling, M. L. Rogers.

The Automatic Retaining Valve Co., Cleveland; $20,000; automatic air-retaining valves; by A. J. Pearson, E. M. Kissin, L. R. Canfield, W. A. McIlrath and J. L. Bradley.

The Ell Kay Mfg. Co., Kansas City; $50,000; to manufacture sheet metal goods; by John H. Kitchen, Josephine Heinzman, Edward F. Sears and William H. Cogswell.

The Cleveland Folding Wire Basket Co., Cleveland; $10,000; to manufacture and sell the F. W. Smith folding crate or basket; by Frank W. Smith, Edgar C. Jefferies, Shirley L. Owens, John H. Williams and H. H. Koonce.

Knapp Automatic Coupler Co., St. Louis; $35,000; to manufacture and vend an automatic coupler, generally used on railroads to couple cars, convey steam, air or hot water, etc.; by George N. Knapp, John R. Knapp and S. F. Crossman.

Volkmar Mfg. Co., Manhattan, New York City; $100,000; to manufacture automatic starting devices for autos, etc.; by William M. Giegerich and Edward Giegerich, both of 1218 Tinton avenue; Bernhard Volkmar, 725 Eagle avenue.

Lion Machine Co., Manhattan, New York City; $100,000; to manufacture machinery; by George S. Krieger, 440 Lafayette street, Brooklyn; Nathan Levitt, 568 Broadway, and Aaron Levitt, 230 Riverside drive, New York City.

General Industrial

The Northern Coal & Dock Co., Duluth, intends greatly to enlarge its plant at Connor's Point, increasing its storage capacity to about 500,000 tons.

The Universal Swing Joint & Machine Co., Louisville, Ky., which recently incorporated at $100,000, and purchased the old plant of the Kentucky Gear & Machine Co., has started operations. B. J. Jansing is president of the company.

The Michigan Electric Welding Co., Detroit, advises that it does not contemplate making any enlargements to its plant at present. It has been adding a considerable amount of machinery, but an addition to its building probably will not be made for a year.

The Oshkosh Steel Construction Co. has been awarded the contract for all structural steel and iron work in the new Bergstrom Paper Mills Co. plant at Neenah, Wis. The construction work will cost $100,000 and the general contract is in the hands of the C. R. Meyer Co., of Oshkosh, Wis.

The Strathmore Paper Co., Mononoco, Mass., has awarded the Barrows-Stewart Co., Boston, the contract for four reinforced concrete buildings, to include a machine shop, 200 x 72 feet, two stories; finishing shop, 184 x 146 feet, two stories; heater shop, 146 x 55 feet, two stories, and stockhouse, 146 x 82 feet, six stories.

Wuest Bros., Louisville, Ky., have established a machine shop and are contemplating entering the manufacturing business in a small way, putting out a patented grinder and possibly adding other lines later. The concern was recently established in a new building at Ninth and Hill streets, Louisville.

The Peerless Motor Car Co., Cleveland, will sell to its shareholders $1,150,000 of stock from its treasury. The additional capital is to meet the growing demand of the business and to extend further the manufacture and sale of its product, including pleasure vehicles and trucks. The sum to be sold represents the remaining unissued treasury stock, which will be offered at par pro rata.

The plant of the Lebanon Chain Works, Lebanon, Pa., has been sold, by representatives of the first mortgage bondholders, to a syndicate headed by Thomas Evans, Lebanon, Pa., and plans are being made for the resumption of operations. Considerable improvement to the plant and some enlargement will be made. The works have not been in operation for two years, owing to financial troubles.

Trade Notes

The Tyler Tube & Pipe Co., Washington, Pa., is now occupying its new office building, 75 x 75 feet, near the main works of the company.

The New Foundry & Mfg. Co., successor to the Sioux City Foundry & Mfg. Co., Sioux City, Ia., has made public announcement that it is operating at full capacity.

The Central Steel & Supply Co., Chicago, representative of iron and steel manufacturing interests, advises that its recent increase in capital stock was made to supply capital for a branch which the company is opening in Minneapolis.

The Iron City Foundry Co., Lebanon, Pa., incorporated in 1908, and subsequently operating in the Ream foundry, has moved into its new structure at Third and Green streets. The new plant is equipped with the latest machinery and is connected with the C. & L. belt line railroad. The foundry is constructed of concrete and brick. The cupola used in the shop has a capacity of seven tons per hour, while the blast is furnished by a 15-horsepower motor.

Fires

Slight damage was done recently by a fire in the basement of the drafting rooms of the Phoenix Iron Co., Phoenixville, Pa.

A loss estimated at $2,500 was done to the two-story brick and frame building of the Empire Foundry Co., Philadelphia, which is operated by the H. A. May Foundry Co.